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A
TREATISE
ON
FEBRILE DISEASES,

INCLUDING
INTERMITTING, REMITTING, AND CONTINUED FEVERS
ERUPTIVE FEVERS; INFLAMMATIONS;
HEMORRHAGIES; AND THE
PROFLUVIA;

IN WHICH AN ATTEMPT IS MADE
TO PRESENT, AT ONE VIEW, WHATEVER, IN THE PRESENT
STATE OF MEDICINE, IT IS REQUISITE FOR THE
PHYSICIAN TO KNOW,

RESPECTING THE
SYMPTOMS, CAUSES, AND CURE
OF
THOSE DISEASES;

WITH
EXPERIMENTAL ESSAYS,

ON CERTAIN FEBRILE SYMPTOMS, ON THE NATURE OF INFLAMMA-
TION, AND ON THE MANNER ON WHICH OPIUM AND
TOBACCO ACT ON THE LIVING ANIMAL BODY.

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NOTE.

That the reader may understand the references to the Plate, it is necessary to observe, that the most shaded parts represent those which are spoken of as appearing red.

A TREATISE, &c.

PART II.

OF SYMPTOMATIC FEVERS.

INTRODUCTION.

WE have now considered all those Fevers which deserve the name of Idiopathic, that is, which are not the consequence of some local affection. A local affection attends the Exanthemata, but has no share in producing the Fever, which is as truly Idiopathic as the simple Synocha or Typhus, and in the mode of practice we found it treated as such.

Among the different orders of Idiopathic Fevers, Intermitting and Remitting Fevers, Continued Fevers, and the Exanthemata, such is the resemblance that it would not perhaps be generalising too much to regard the whole as one disease, their differences rather marking varieties than species.

The remaining orders of Dr. Cullen's Pyrexia, namely the second, fourth, and fifth, the Phlegmasia, Hemorrhagia, and Profluvia, essentially differ from the foregoing. In these we shall find a local affection the primary complaint, and the fever so constantly proportioned to it that we can almost always judge decisively of the degree of the local affection by observing that of the febrile symptoms.

Is it surprising then that the maxims on which the treatment of these complaints is founded should differ widely from those which regulate the treatment of fevers properly so called, and the exanthemata? For *these reasons*, which I have considered more at length in the general Introduction, I divided Dr. Cullen's Pyrexia into two classes, abandoning the term altogether, and using instead of it, for want of simpler terms, the circumlocutions, Febres Idiopathicae and Febres Symptomaticae. The latter we are now to consider.

Symptomatic Fevers were defined, a primary local affection, attended with increased temperature and a frequent pulse.*

In this class are arranged three orders, the Phlegmasiæ, Hemorrhagiæ, and Profluvia.

The first of these orders was defined, Symptomatic Fevers, in which the local affection is either an external inflammation, or a fixed pain with derangement of some internal function.

Hemorrhagies were defined, Symptomatic Fevers, in which the local affection is a flow of blood not occasioned by external injury.

The definition given of the last order, the Profluvia, was, Symptomatic Fevers, in which the local affection is an increase of some colourless excretion.

But before we enter on this class of diseases, it will be necessary to make some observations on the local affections which attend them.

1. Of the Local Affection of the Phlegmasiæ.

The local affection of the Phlegmasiæ sometimes appears without being accompanied by fever. Such cases I shall term Inflammations, in contradistinction to Phlegmasiæ.

Whatever systematic writers have done in their systems of nosology.† they have always in their systems of practice, either avowedly or not, treated of simple inflammations before they have entered on the Phlegmasiæ.

Of the Symptoms of Inflammation.

Simple Inflammations are of two kinds, the one vulgarly termed a pimple, and the other which may be termed a stain, blotch, or efflorescence. Neither of these complaints is included in D. Cullen's nosology.‡ The former, which appears almost exclusively on the face, is different from his Phlegmon (boil), which may appear on any part, and often produces fever.

In the nosology of Sauvages pimples are mentioned in the definition of the Efflorescentiæ the second order of his first class (Viitæ). He terms them Pustulæ; the definition of the order is "Tumores humorales exigui gregales, vel cutis elevatio per pustulas, papulas, phlyctænas, varios, similesve asperitates." After giving this definition, Sauvages begins to explain the terms employed in it, demonstrating the imperfection of his mode of arrangement, since pimples are not always symptomatic. Sagare

* See the general Introduction, p. 39.

† See general Introduction, p. 24.

‡ See general Introduction, p. 26.

makes them a genus. They are defined by Sauvages, "Phyma parvulum apice ruptum."

I shall adopt the term Pustule from Sauvages, but not the definition, for reasons which will readily suggest themselves as we proceed.

With respect to the other species of inflammation, it is more difficult to find a technical name which shall be unobjectionable; this inflammation having generally been confounded with a local affection which resembles it but occasions fever.

In looking over the nosological systems of Sauvages, Linnæus, Vogelius, Sagare, Dr. McBride, and Dr. Cullen, we find this disease, or rather a disease resembling it, mentioned, as a genus, only by Sagare. The Bacchia of Linnæus, Encausis of Vogelius, and Psydraciæ of Sauvages, seem to include it, but not very accurately.

Sagare terms it Bacchia; it is his ninth genus, and the fourth of the order Efflorescentiæ. The following is the definition of the genus, which is as readily understood without as with that of the order. "Maculæ rubræ, vel efflorescentiæ nasi et partium adjacentium eidem, guttata, plus minus prominentes, asperæ, furfurascens, diuturnæ; hoc genus anbigit inter maculas et efflorescentias."

This definition does not very accurately apply to the inflammation we are speaking of, in which the surface is uniformly smooth. The inflammation here described by Sagare indeed frequently occurs, but I think it proper to overlook it for several reasons. Were we to rank as a distinct genus every cutaneous inflammation *which in any respect differs from every other*, instead of two, we might have 50 diseases of this kind; besides, our knowledge of cutaneous diseases is too imperfect to permit us to divide and subdivide them in this manner. By dividing them into two species which comprehend all the others, our intention in a nosological system is fully answered, and if the varieties of these species differ in the modes of practice suited to them, these modes of practice have not been ascertained.

It is sufficient therefore to divide inflammations properly so called, into two species, the Pustule, and, what I shall term, Erythema, for reasons given in the first vol. (pages 342 and 343.)

These species of cutaneous inflammations are distinguished in the following manner. In the one (the Pustule) there is an evident swelling rising in the shape of a cone, the apex of which is sooner or later formed into a small cavity, filled with yellow matter called pus. In the Erythema there is no swelling of this kind, although some general swelling of the part it occupies, is always more or less observable. The surface is uniformly smooth,

there is no sudden elevation of the cuticle, and pus is never formed.

Of both inflammations redness is a characteristic symptom ; but in the former it extends only to the little cone, and a short way around its base ; in the other it is more diffuse, frequently spreading over the face and hands in a perfectly uniform manner.

They also agree in being frequently attended with some degree of pain, which in the Pustule is more obtuse and pulsatory, in the Erythema often stinging ; in this respect however there is considerable variety. In both species the temperature of the part is increased.

All inflammations then (for they are all included in these, which may be looked upon as the extremes, if indeed there be any well defined inflammation between them) agree in being attended with redness, increased temperature, pain, and swelling. Whenever these occur they constitute inflammation, and may therefore be assumed as the definition of this order, which belongs to the locales.* “*Notæ vero inflammationis,*” Celsus observes, “*sunt quatuor, Rubor et Tumor cum Calore et Dolore.*”

This order then is divided into two species, the Pustule and the Erythema. The former may be defined,

Inflammatiō, tumore circumscripto, in fastigium elevato, sæpe in apostema abeunte.

The Erythema may be defined,

Inflammatiō, rubore uniformi serpente, tumore partis sæpe vix evidente.

We should rank as varieties of these inflammations some diseases, which, for the want of such an order, Dr Cullen arranges among the Pyrexia, particularly some species of Ophthalmia and the Aphthæ Infantum.

Inflammation varies according to its termination, resolution, suppuration, or gangrene ; according as the suppuration produces a well or ill conditioned sore, &c. but of this hereafter.

Of the Causes of Inflammation.

Of the remote Causes of Inflammation.

All parts of the body, if we except a very few, the cuticle, nails, hardest parts of the teeth, and hair, are subject to inflammation.

As the seat of simple inflammation is always in the skin, to the causes affecting this organ we are to look for the causes of

* See general Introduction, p. 24.

this complaint. Some of these I have already had occasion to mention in considering Eruptive Fevers. Some eruptions we found particularly connected with the state of the primæ viæ. Derangement of these passages may be regarded as a principal predisposing cause of simple inflammation. It is sometimes sufficient to excite it. In those who are subject to Pustules or Erythema of the face, they are often produced by indigestion.

Among the predisposing causes may also be ranked too full a diet, particularly too free an use of fermented liquors. Too scanty and poor a diet also sometimes gives the same predisposition, the same may be said of whatever debilitates fatigue, excessive venery, &c. which act also sometimes as exciting causes. In short we shall find that there are two very opposite states of the system favourable to inflammation, a state of debility, especially if attended with plethora, and a state of increased excitement.

Such are the causes of inflammation acting on the system in general; those which act locally may be arranged under three heads.

1. Whatever increases the impetus of the blood towards the part.

2. Mechanical irritation.

3. Chemical irritation, under which are included extremes of temperature.

It is to be recollected that the effects of any temperature are not proportioned to its degree only, but to that and the difference between it and the previous temperature of the part to which it is applied; hence sudden changes of temperature are apt to excite disease. There are few causes of simple inflammation more frequent than suddenly warming the hands or feet when chilled with cold.

The causes of the Phlegmasiæ are the same with those of simple inflammation, for in these we shall find that the local affection excites fever, not because it is of a different nature from simple inflammation, but because it is more extensive, or situated in a part of greater importance and sensibility.

Of the proximate Cause of Inflammation.

Inflammation forms the principal part of so many diseases, that to determine its nature is an object of the first importance.

It was observed when speaking of the *modus operandi* of emetics* that such is the constitution of the animal body, that

* See vol. i. p. 105, &c.

whatever injures it, excites motions calculated to correct or expel the offending cause. This observation we found illustrated by the operation of emetics, cathartics, &c. In such cases we can readily trace the motions excited, and the manner in which they act, but cannot trace the manner in which the offending cause excites these motions.

An emetic excites the action of the diaphragm and abdominal muscles which is necessary for expelling it, but why it excites these muscles and not those of the limbs for example, we cannot tell. The final cause is evident, but the efficient cause is hid in the utmost obscurity.

Till we are enabled to trace the intervening events between the irritation of the stomach, and the action of the muscles employed in vomiting, our knowledge of this operation must be imperfect. And imperfect we have reason to believe it must ever remain; for although we can trace the motions excited in the larger parts of the animal machine, we cannot hope that our senses, assisted by all that art can do, will ever detect the finer motions of this wonderful structure.

What microscope will detect the changes in a nerve, while it conveys impressions or obeys the dictates of the mind? What differences can we detect in the encephalon of the most illiterate and the most learned, in those of the dullest and the brightest, genius? Nay, if we except the motion of the vessels, and the difference of temperature, we can detect no difference between the living and the dead brain. How vain then is the hope of arriving at a knowledge of the more minute motions of the animal system!!

Most physiologists, in their researches concerning the animal functions, have wisely admitted that the changes which take place in the nervous system are placed beyond our view; and those who have aimed at tracing them have only shewn the futility of the attempt. In physiological enquiries, therefore, the changes which take place in the nervous system, on which sensation and motion depend, are overlooked, and we confine ourselves to tracing the phenomena which are the causes or consequences of such changes, and when we have succeeded in tracing these phenomena in any function of the system, we consider ourselves as having arrived at a knowledge of that function. The knowledge indeed is very incomplete, but it never perhaps can be less so. In this sense we say we understand the operation of vomiting, coughing, &c. and if we are right as far as we attempt to go, these operations, we have reason to believe, never can be better understood.

Now if it can be shewn that inflammation, like vomiting and coughing, is an effort of the system to remove an offending cause, and if we can trace every step of this operation with the

exception of the changes induced on the nervous system, we understand the nature of inflammation as completely as that of any function of the body.

But before we enter on this part of the subject, let us take a view of the opinions which have hitherto prevailed respecting the nature of inflammation, and see how far they are well founded.

Of the opinions which have generally prevailed on this subject, four only deserve attention.

1. That which supposes a morbid lentor of the blood clogging the minute vessels.

2. That which supposes what has been termed *error loci*, the grosser parts of the blood getting into vessels too small to transmit them.

3. That which supposes a spasm of the extreme vessels.

And lastly, that which attributes inflammation to a morbidly increased action of the vessels of the part; and this is the favourite hypothesis of the present day, at least with the medical men of this country.

The reader will readily perceive that the principle of the three first doctrines is the same. In all, obstruction is regarded as the proximate cause of inflammation. It is surprising therefore that none of the supporters of these hypotheses thought of trying whether or not obstruction is capable of producing inflammation. Admitting that the vessels are obstructed, it does not follow that an accumulation of blood will take place in the part; the blood may pass off by anastomosing branches, or the vessels may resist the distending force. If it be found that obstruction of the vessels may exist without producing a single symptom of inflammation, what becomes of these doctrines!! The following experiment seems to determine this point.

I passed a hot wire through the web of a frog's foot, by which the skin about the hole was shrivelled, and the vessels obstructed, no fluid of any kind being discharged. Here an obstruction was produced surely more than equal to what takes place in many inflammations of small extent, and yet no symptom of inflammation followed; every part of the web appearing as pale as before the experiment.

It remains to enquire how far the opinion, of inflammation depending on a morbidly increased action of the vessels of the part, is well founded.

Whatever may be the arguments now brought in support of this hypothesis, there can be no doubt I think respecting its origin. It was an inference from the mistaken opinions which prevailed respecting the cause of animal temperature.

When physicians believed the temperature of the animal body to depend on the friction of the blood against the sides of its vessels, it was a natural inference that when the temperature of any part was increased above the usual degree, the motion of the blood in that part, the only acknowledged cause of animal temperature, was increased in the same proportion.* But the velocity of the blood cannot it is evident be partially increased, except by an increased action of the vessels of the part.†

It required no nice experiments however to discover, that the circulation is as rapid in many of the cold, as in some of the warm, blooded animals, and consequently, that the received doctrine of animal temperature was erroneous.

With this doctrine the hypothesis, which was founded on it, should have been abandoned.

But admitting that animal temperature depends on the motion of the blood, does the blood move with increased velocity in an inflamed part? Whether it does or not, the supporters of the hypothesis before us have not thought it worth while to enquire. What if the blood is found to move more slowly in an inflamed than in a sound part!

It will hardly be believed that the increased redness of the part has been adduced as an argument in favour of the same hypothesis; for admitting that the increased redness, which can only depend on an increased quantity of blood in the vessels, (for all admit that in inflammation there is not necessarily any extravasation of red blood); admitting, I say, that the increased redness depends on an increased action of the vessels, it would baffle the most acute to shew how it could possibly be; how a more vigorous contraction of the vessels can enable them to receive a greater quantity of blood.

* “Arenixu, pulsu, compactu, vasorumque adhuc meabilium angustatione a tumore obstructorum, attritus fit ingens partium liquidi inter se, in solidum, solidi in illas, inde caloret æstus.” Aph. Boerhaavii. 382.

† “The phenomena of inflammation all concur in shewing that there is an increased impetus of the blood in the vessels of the part affected; and as at the same time the action of the heart is not always evidently increased, there is reason to presume, that the increased impetus of the blood in the particular part is owing especially to the increased action of the vessels of that part itself.” Dr. Cullen’s First Lines, par. 239th. “Inflamed vessels seem likewise to acquire a great deal of additional strength or at least they act with greater energy than formerly, *for the blood is observed to circulate with far greater rapidity through an inflamed than through an uninfamed part*” See a paper, by Mr. Moore, on the process of nature in filling up cavities, &c. which obtained the prize-medal given by the Lyceum Medicum Londinense for 1799. Is it not surprising that physicians should have so decidedly made up their opinion respecting the state of the circulation in an inflamed part, when it is certain, that none had been at the trouble to examine it!

I need hardly remind the reader of what is generally admitted respecting the structure of the blood-vessels, and the manner in which they assist the heart in supporting the circulation.

Every systole of the heart distends those arteries into which it immediately propels the blood. But the artery is furnished with an elastic coat which resists this pressure, and which, immediately after the impulse which distends it ceases, begins to resume its former dimensions, contracting the diameter of the artery, and thus pressing the blood on in that direction where the least obstacle is opposed to its passage, that is, forwards, the valvular structure of the arteries where they leave the heart preventing its return to this organ.

But we are acquainted with no body so perfectly elastic as to return to its former dimensions with a force equal to that which compressed or distended it. If then there be no power inherent in the arteries by which the blood may be propelled, but a degree of elasticity, the impetus given by the heart must not only be sufficient to overcome friction and other causes impeding the circulation in every part of the body, but also to admit of considerable diminution from the loss it suffers in distending the blood vessels.

It would be improper here to enter on the various arguments which render the opinion of the circulation depending on the action of the heart alone, inadmissible; nor is it necessary, since this opinion I believe is universally abandoned. The vessels, then, are endowed with a power different from mere elasticity, and there are a sufficient number of observations to leave no room to doubt, that this power differs only in degree from that of the heart, that is, is a muscular power.

Such are the powers of the blood-vessels; let us consider how an increased exertion of these powers, what has been called a morbidly increased action of the vessels, in any part, can there occasion a morbid accumulation of blood.

When we speak of a morbidly increased action of vessels, do we allude to the state of their muscular coat? If the muscular fibres of the blood-vessels run transversely,* what must be the effect of unusual contraction? An unusual diminution of their area. Do we mean by morbidly increased action, an increase of elasticity; the consequence of this can only be a greater tendency in the vessel to preserve its mean area.

After each contraction of the muscular coat, the elastic acts as its antagonist till the vessel arrives at the mean degree of dilatation; but after this there is no farther power of distention inherent in the vessel. The action of the elastic coat ceases, and it is needless to observe that a muscular fibre has no power to distend itself.

* See the Observations and Experiments of Haller and others.

The only power by which the vessel can be farther distended is the *vis a tergo*; after the vessel arrives at its mean degree of dilatation, both the elastic and muscular coats act as antagonists to the *vis a tergo*,* to the force propelling the blood into, and thus tending farther to dilate, the vessel. If then the *vis a tergo* becomes greater than in health, the powers of resistance inherent in the vessels remaining the same, or if the latter be weakened, the *vis a tergo* remaining the same, the vessel must suffer a morbid degree of dilatation. There appear to be no other circumstances under which a vessel can suffer such dilatation.

The opposite of this state is, when the power of the vessels remaining the same, the *vis a tergo* is diminished; or the *vis a tergo* remaining the same, the power of the vessels is increased, and this opposite condition produces an opposite state of the vessels, a preternatural diminution of their area.

In the one case, the distending bears too great a proportion to the resisting force; and preternatural distention is the consequence. In the other, the resisting bears too great a proportion to the distending force; and preternatural contraction is the consequence.

But it is said that an increase of the resisting force, that is, an increased action of the vessels in any part, occasions increased redness. Increased redness can only be the effect of an increased quantity of blood in the part. That the quantity of blood in any part may be increased, either the area of its vessels must be increased, or blood must be extravasated.

Let us for a little advert to the only attempt to reconcile the phenomena of inflammation to the popular doctrine which, as far as I know, has been offered to the public, namely, that by Dr. Fowler of Salisbury,† in his inaugural dissertation, published at Edinburgh in 1793, entitled "*Quædam de Inflammatione.*"

Dr. Fowler's attention had for some time been turned to the subject of inflammation, and his attempt is perhaps as good a one as the nature of the case admits of; how far it is successful the reader may judge.

In defending his own opinion, Dr. Fowler is led to combat that proposed about the year 1790 by Dr. Lubbock and Mr. Allen;‡

* The more vigorous the muscular coat, the more readily it is thrown into action by the distending power, and the more powerfully it acts.

† Previously well known to the medical world by his *Essay on Galvanism*.

‡ It has been asserted, that the opinion here alluded to is of much older date; and that imperfect traces of it are to be found in the works of various writers cannot be denied, but their observations in one passage contradict those in another, so that Dr. Lubbock and Mr. Allen have the merit of having first advanced the opinion in a connected form, and of

But in stating this opinion, "*arterias inflammatas, quam in statu sano debiliores esse,*" he commits an inaccuracy which runs through many parts of his reasoning.

According to the late theory of inflammation, it is not necessary that the vessels should be in a state of greater debility than in health; for their action may be more powerful; it is only maintained that the proportion which their action bears to the *vis a tergo* is less than in health. The *vis a tergo* remaining the same, the vessels before inflammation can take place according to this doctrine, must be in a state of debility; but if the *vis a tergo* is increased, as in Synocha, inflammation may take place although the vessels of the part act as powerfully as in health or more so. But after the inflammation has taken place, as they are supposed to be preternaturally distended, we must suppose them debilitated. To take Dr. Fowler's observations in the order in which he gives them.

"*II, quibus altera opinio maxime placet, contendunt, auctam actionem arteriarum partis inflammatae demonstrari calore immodico, qui nunquam nisi ex cursu sanguinis incitatori nascitur,**" &c. "*Calet præter modum, quia (ut omnia quæ exhibet animal, phenomena demonstrant) caloris evolutio fere semper in ratione est arteriarum actionis.*"†

To what phenomena does Dr. Folwer allude? It is true that the temperature of the animal is increased when the circulation becomes more rapid, in consequence of exercise for example. so that the blood is sent more frequently through the lungs; but where are the phenomena which prove that an increased action of the vessels of any part, increases the temperature of that part? The only case to which Dr. Fowler can allude is that of inflammation, for in no other is there a local increase of temperature, so that he is here begging the question, the very subject of dispute is whether or not the vessels of an inflamed part are in a state of increased action.

I may refer to the observations and experiments of Dr. Crawford, Lavoisier, Girtanner, Hassenfratz, and almost every other

having separated it from the remains of the old hypothesis. Neither of these gentlemen have, as far as I know, published any thing on the subject, nor made experiments to ascertain the truth of their opinion. With the particular sentiments of Dr. Lubbock on the subject I am unacquainted. In the Medical Society of Edinburgh I have often heard Mr. Allen, with much perspicuity, defend his opinion of the proximate cause of inflammation, resting his defence on this ground alone, that it is the only hypothesis on which we can explain the increased redness of an inflamed part. It will appear, as far as I can judge, from the experiments I am about to relate, that we may go farther, that it is the only doctrine of inflammation by which we can in a satisfactory manner explain any of its phenomena.

* Page 9.

† Page 24.

late writer on the subject. to prove that arterial blood is converted into venous, that is, has its capacity for caloric lessened even while it stagnates, and, we have reason to believe, as readily as when it is moved with its greatest velocity. The rapidity with which it evolves caloric, not depending on the velocity of its motion, but on its degree of oxygenation. There is not therefore a shadow of reason for supposing that an increased action of vessels which is merely local, must occasion an increased evolution of caloric.

In another place* Dr. Fowler again begs the question by adducing the increased pulsation in an inflamed part as an argument for his opinion.

Dr. Fowler is at much pains to prove what, as far as I know, has not been questioned, that when the arterial trunks supplying any part are debilitated, no inflammation ensues,† *h. e.* that when the *vis a tergo* is destroyed or nearly so, (for let it be recollected that in the capillary, not in the larger arteries, we are to look for the proximate cause of inflammation, as will presently more fully appear) inflammation is not the consequence. Nor can it possibly be according to the hypothesis of Dr. Lubbock and Mr. Allen. How can the action of the vessels bear too small a proportion to the *vis a tergo* where no *vis a tergo* exists, or where the diminished action of the capillaries is owing chiefly, or in great part, to the diminished *vis a tergo*. The hypothesis which Dr. Fowler here opposes, therefore, is one of his own creation. In speaking of that he means to oppose, he constantly keeps in view his erroneous statement of it. If I understand the doctrine in question, it supposes all the larger arteries of an inflamed part in a state of increased action.

As no account of this doctrine has been published by its authors, there is no work to appeal to for their opinions; I can only observe therefore, that the view of the doctrine I here give is, I believe, the same which is taken of it by Dr. Lubbock and Mr. Allen: but whether it is so, or not, it is that which we are about to consider, and consequently Dr. Fowler's observations are of consequence at present only as far as they affect this view of it.

Whether Dr. Fowler or I take an erroneous view of Dr. Lubbock and Mr. Allen's opinions, they only can determine. But whether the doctrine of the proximate cause of inflammation, such as I state it, is just, (the only point in which the public is interested) must be determined by an appeal to facts.

Against this view of the doctrine then it is evident that the following observations of Dr. Fowler are of no weight. "*Sed præcipue a sensu pulsationis in parte, quo certe indicatur, differentiam contractions inter et dilatationes arteriarum (ex qua*

* Page 18.

† Pp. 11, 12, 22.

"pulsus percipitur) majorem esse in inflammatis quam in sanis arteriis."* "Nemo sanus negabit arterias, tonsillarum in cynanche maligna; artuum in rheumatismo chronico; scroti in hydrocele; urethræ post gonorrhœam multo debiliores esse, quam in cynanche inflammatoria; in rheumatismo acuto; in inflammatione testiculorum; vel denique incunte gonorrhœa: non tamen in illis sed in his exemplis tumor et maximus reperitur, et vasa sanguinea turgidiora."† Since the degree of the inflammation is not proportioned to the debility of the vessels of an inflamed part, but to the diminished proportion of their power to the vis a tergo, the greater the vis a tergo, ceteris paribus, the more considerable must be the phenomena of inflammation. It is not difficult to explain therefore why the swelling and other phenomena of inflammation are more considerable in the latter than in the former, cases.

With respect to the argument drawn from inflammation seeming sometimes to restore the vigour of debilitated parts,‡ it may be observed, in the first place, that the hypothesis Dr. Fowler combats, supposes that the larger arteries of an inflamed part are in a state of increased action; but this is not a fair argument in favour of either opinion, as we can by no means explain in what way inflammation acts in such cases. It cannot be by directly restoring the vigour of the blood-vessels, because we know that inflammation, even in a part previously sound, leaves the vessels debilitated.

In an inflamed part the capillary arteries are in a state of debility, the larger in that of increased excitement.|| The difference between what is called active and passive inflammation depends on the degree in which the larger arteries are excited; and, we have reason to believe that in the cure of inflammation by resolution, in proportion as the debilitated capillaries are excited to action, the action of the larger arteries abates, and the inflammation is cured as soon as the proper equilibrium is restored between the larger arteries and the capillaries, although the vessels of the part are upon the whole in a state of greater debility than previous to the attack of the disease.

And that such is the case will appear probable, among a variety of more direct observations, from this consideration alone, that when the inflammation is of such importance and extent that the increased action of the larger vessels extends to the heart, so that the inflammation is attended with general increased action of the vascular system, that is, with Synocha, we observe that, as the inflammation yields, the general excitement subsides; and that when the inflammation is removed, the whole

* Page 9.

† Pages 12 and 13.

‡ Page 13.

|| See the experiments and observations hereafter related.

system is left in a state of greater debility than before the disease.

In short, inflammation seems to consist in the debility of the capillaries followed by an increased action of the larger vessels, and is terminated as soon as the capillaries are so far excited, and the larger arteries so far weakened by their excessive action, that the force of the capillaries is in due proportion to the *vis a tergo*.

This doctrine we shall find supported by direct experiment, and at once capable of accounting for all the phenomena and causes of inflammation, and explaining in the most satisfactory manner the remedies which relieve it whether attended with fever or not ; nay, suggesting improvements in the mode of treating the phlegmasiæ, which we have reason to believe may be of some importance.

According to this opinion, it will perhaps be said, the vessels of a part may be debilitated, and yet no inflammation take place !! Is this what has been termed the new doctrine of inflammation ? I believe it is, but whether it is or not, it is that which, as far as I am capable of judging, is an unavoidable inference from a very simple set of experiments and observations.

But Dr. Fowler endeavours to support the popular hypothesis by experiments, as well as inferences from the phenomena of inflammation. Let us see how far this part of the attempt is successful.

He quotes an experiment of Verschuir to prove, that although inflamed vessels are contracted in some parts, they suffer a proportional dilatation in others. But Verschuir's experiment was made on a large vessel, whereas the proximate cause of inflammation must exist in the capillaries, in which it is evident, with the assistance of the microscope, that inflammation begins ; besides, we shall presently find that an inflamed vessel never assumes the appearance described by Verschuir.

"Major nempe, aut minor portio sanguinis projicietur in partes dilatatas arteriæ, prout major minorve portio sit quæ e partibus contractis extrudatur."* This mode of reasoning would be just, were the vessel's tubes closed at both ends ; but what prevents the blood, which is extruded from the contracted parts of the vessels, from moving forward, as we shall find from direct experiment it does, when the vessel acts with increased, as when it acts with its usual, force ? The only difference is, that in the former case the blood moves with greater velocity. What detains it to occasion a preternatural dilatation of any part of the vessel ? To account for such a state of the vessels, we must

* Page 15.

have recourse to the doctrine of obstruction, which we shall find doubly refuted, by the experiment already related, and the experiments which support the doctrine which we are about to consider.

Dr. Fowler irritated the ear of a rabbit by gently rubbing it; it became red, but soon resumed its natural colour; the irritation was repeated with the same effect more than ten times in a quarter of an hour. "*Vim contractilem arteriarum,*" he observes, "*minime exhaustam fuisse frictione, ut nonnulli volunt: nam si fuisset, omnino improbabile est, eandem (admoto iterum stimulo) tam cito et frequenter potuisse redintegrari.*" I need hardly observe, that any conclusion from this experiment is begging the question. Has Dr. Fowler determined how long a time is necessary in such circumstances for restoring the excitability; but it would have been of no consequence if he had, his conclusion would still on several accounts have been exceptionable. He still keeps his, as it appears to me, erroneous definition in view, and forgets that inflammation may be excited in any part by stimulating the larger vessels, the capillaries remaining in statu quo.

Besides, he overlooks a fact well known, and which must strike every one, in making even coarse experiments on the circulation, that the farther the vessels are removed from the heart, the more readily they are debilitated. I have known a degree of friction, which would produce no sensible effect on a vessel of the 20th or 30th part of an inch in diameter, instantly produce such a degree of debility in the capillaries, that in the space of a few seconds they were distended by the vis a tergo to two or three times their former diameters. Might not the friction in the foregoing experiment then, while it excited the larger arteries, debilitate the capillaries? Nay, the very circumstance of exciting the larger arteries is sufficient to debilitate, by overdistending, the capillaries; but as soon as the friction was removed, the preternatural excitement of the larger arteries ceasing, the capillaries regained their vigour. This account of the phenomena we shall find consistent with every thing which seems ascertained respecting the nature of inflammation. But only granting that it is possible to explain the phenomena in this way, Dr. Fowler's inference from his experiment, it is evident, is invalidated.

With regard to Dr. Fowler's experiment in which the trunk of an artery in a rabbit's ear was laid bare, it is only necessary to observe, as of the experiment he quotes from Verschuir, that it has no relation to the point in question, the proximate cause of inflammation having its seat in the capillaries, and it being admitted on all sides that the larger vessels of the part are in a state of increased action.

When the larger arteries are debilitated, and consequently distended, the complaint, which has been termed *turgescence* or *par-*

tial plethora, is of a nature quite different from inflammation. In this case there is little or no accumulation of blood in the capillaries, as appears from their being pale or only slightly turgid, the vis a tergo from the debilitated state of the large vessels being too weak to distend them, although we have every reason to believe that they partake of the debility of the part; but that debility not being increased by preternatural distention, as here happens in the large vessels and in the capillaries of an inflamed part, they preserve the circulation, so that the state of turgescence and inflammation are exactly opposite. In the one case, the action of the capillaries is weak, compared with that of the larger vessels; in the other, the action of the larger vessels, compared with that of the capillaries. The justness of this distinction will, I think, appear more fully as we proceed in considering the nature of inflammation. On the difference of these states depends all the difference between the cold apoplectic, and the furious phrenitic.

Dr. Fowler's experiment on the large artery of the rabbit's ear was unnecessary;* a limb covered with varicose veins would have answered his purpose equally well; there the vessels are evidently much debilitated, and yet there are no symptoms of inflammation. Nor need he have made that with opium on the ears of six rabbits; he might have found many a paralytic limb from which he might with equal accuracy have drawn his conclusion, "*Distentionem partis alicujus arteriæ non ex debilitate tunicæ ejusdem muscularis provenire (quoniam quo magis debilitata eo minus distenta fuit arteria): sed ex contractionum vigore et frequentia.*"† Or he might have found the vessels in the last stage of hemorrhagy in precisely the same state with those of the rabbit's ears. In short, his experiment proves what I believe has not been questioned, that in proportion as the vis a tergo is lessened, the vessels are less distended.

I shall quote but one more passage from Dr. Fowler's Treatise. Of the colour of an inflamed part, he observes, "*Rubet etiam fortasse, quia plus sanguinis in venas propellitur, quam ab eis facile potest reduci; actione earum non pari ratione, ac arteriarum adaucta.*"‡ By what experiments has Dr. Fowler discovered that the veins of an inflamed part are less excited than the arteries? But the phenomena of inflammation having forced him into this assertion, he admits almost all that his opponents contend for; if the veins are in a state of preternatural distention, they must be in a state of debility; but he says the arteries are in a state of increased action! What nice line of distinction has Dr. Fowler discovered between a capillary artery and the vein in which it terminates!|| He adds besides, "*Valde porro proba-*

* Pp. 20, 21.

† Pp. 22, 23.

‡ Page 23.

|| If the reader will take the trouble to view, through the microscope by transmitted light, the edge of a fish's fin, he will see the red capillary

"bile videtur ruborem, magna saltem ex parte, deberi vasis lymphaticis sanguine jam turgidis."* Are not the colourless† a principal part of the capillary arteries? Can they admit the red particles without being preternaturally distended? Can a state of preternatural distention exist without debility?

But why did not Dr. Fowler at once determine the point in dispute, by observing an inflamed part through the microscope? This is surely the most decisive and simple experiment. Had he thus determined that the blood is moved with increased velocity in an inflamed part, there would no longer have been a shadow of doubt respecting the increased action of the vessels in inflammation.

I shall not anticipate what I am about to say in support of the new theory of inflammation; the prevalent opinion will be sufficiently refuted by the following experiment alone.

All that is necessary in order to determine whether inflammation consists in an increased action of the vessels, is to induce such an action, and observe whether inflammation is the consequence. Having adapted the web of a frog's foot to a microscope, I now and then observed the velocity of the circulation for some minutes, which during this time continued, as far as I could judge the same. I then wetted the foot with distilled spirits, and in a few seconds observed the blood in all the vessels of the web moved with a wonderfully increased velocity. which, as I constantly kept the web moist with spirits, continued as long as I observed it, ten minutes or a quarter of an hour. But during no part of the time could I perceive the slightest symptom of inflammation, either with or without the microscope. The vessels, instead of appearing redder and more turgid, were evidently paler and smaller than before the application of the spirits. I still farther increased the velocity of the circulation in the web by throwing on it the concentrated rays of the sun from the speculum of the microscope, and still with the same effect.

An excessive application of these agents would unquestionably have deprived the vessels of their excitability, and then the phenomena must have been different. It is well known however, that the excitability of amphibious animals is exhausted with dif-

arteries running into their corresponding veins, and forming with them small arches, arranged with much regularity, in which, from the degree to which it is necessary to magnify the part, the globules of the blood seem to move with astonishing velocity, presenting an appearance striking and beautiful beyond, perhaps, any other which the microscope affords.

* Page 23.

† I translate lymphaticis, colourless, because Dr. Fowler cannot surely suppose that, in inflammation without extravasation, the blood gets into the lymphatics properly so called.

ficulty. The heart of a frog will beat many hours after it is removed from the body. I therefore failed to destroy the excitability of its vessels by any means I employed in this experiment. We shall presently see what are the effects of impaired excitability of the capillary vessels.

Is it not a fair inference from all that has been said, that the opinions hitherto maintained respecting the nature of inflammation, namely, those attributing it to obstructing lentor, error loci, spasin, and increased action of all the vessels of the part, are false? Let us now inquire how far the opinion of Dr. Lubbock and Mr. Allen, which I have already had occasion to explain at sufficient length, is well founded. If it is proved to be well founded, all the foregoing opinions are doubly refuted; and with respect to the last of these, as it has been shewn that where increased action of all the vessels of a part is present, inflammation is not, if it can be shewn that where inflammation is present, increased action of all the vessels is not, there will not surely remain the shadow of an argument to support it.

It is no difficult matter to determine the state of the circulation in an inflamed part. An inflammation had been excited, I do not know how, in the web of a frog's foot; having applied it to the microscope, I found the vessels of the part greatly dilated, and the motion of the blood extremely languid. In several places, where the inflammation was greatest, it had ceased altogether. It was at once evident, on observing the part through the microscope, that where the inflammation was greatest the vessels were most dilated, and the motion of the blood was slowest. Nor did I, in one instance, observe the alternate contractions and dilatations supposed by Dr. Fowler to be the very essence of inflammation.

The distention of the vessels, which in the healthy state admit only the colourless parts of the blood, was apparent, for in the inflamed parts a much greater number of vessels admitted the red particles than in the sound, and the interstices of the red vessels appeared more opake, probably from the enlargement of innumerable small vessels, still too small to admit the grosser parts of the blood.

While I was viewing the inflamed web it occurred, that if I could succeed in stimulating its vessels to action, and thus remove the inflammation, which by this time I was thoroughly convinced depended on their debility, this would be an additional proof of the doctrine before us.

With this view I wetted the inflamed web with distilled spirits, at the same time throwing upon it the concentrated rays of the sun from the speculum of the microscope. The blood, in all the

vessels except in those of the most inflamed part began to move with greater velocity, and in proportion as this took place, the diameters of the vessels were diminished, and the redness became evidently less remarkable the web seemed paler, and the interstices of the vessels became less opaque.

In the most inflamed part however the blood was still stagnant. After I had despaired of restoring action to the vessels of this part, I saw the blood begin to move slowly in a vessel which ran directly through the middle of it. It soon acquired a considerable velocity, and on taking a superficial view of the part through the microscope, the course of this vessel appeared like a streak of a lighter colour through the middle of the red inflamed part.

This experiment appeared decisive. As I had not however observed the inflammation from its commencement, I repeated the experiment, with the assistance of the Rev. Mr. Boraston, on a small fish (the lampern.)

We found that continued exposure to the air produces a degree of inflammation, evident to the naked eye, in the fins and tail of this fish. On viewing the former through the microscope, we observed the circulation become more languid, and the vessels enlarge as the inflammation came on. The motion of the blood in the most inflamed vessels at length ceased altogether.

By gentle friction and applying distilled spirits, we repeatedly succeeded in accelerating and even renewing the motion of the blood, and in proportion to the velocity of the circulation, the vessels became evidently paler, the deeper red returning as the circulation again became more languid.

On roughly irritating a part where there was no inflammation, the part being pale and the circulation rapid, the motion of the blood was for a second or two wholly interrupted, (Mr. Boraston observed the part while I irritated it) the force I used having compressed the vessels. The *vis a tergo* however soon forced the blood into them, and this experiment having been repeated several times both Mr. Boraston and myself saw the now debilitated vessels of the parts which had been irritated, gradually dilated by the blood propelled into them, till the vessels having acquired many times their former dimensions, the part appeared highly inflamed. The motion of the blood at the same time became extremely languid, and in the most distended vessels ceased altogether. Some, even of these last, we succeeded in exciting to action, and in proportion as the motion of the blood was accelerated, the vessels became paler, the inflammation being evidently diminished. In these experiments there was no extravasation of blood, except in one instance in which the vessels were so roughly irritated as to wound some of them.

The foregoing experiments having been made on cold blooded animals, to obviate any objection which might hence arise, it was necessary to repeat them on an animal of warm blood.

The ear of a very young white rabbit seemed from its transparency the most proper subject for such experiments. It was accordingly submitted to the microscope, with every advantage of light that could possibly be obtained, but the endeavours, both of Mr. Boraston and myself, to distinguish the circulation with sufficient accuracy, were fruitless. The only alternative therefore which remained was an experiment of a very unpleasant nature.

I made a small opening through the skin and muscles of the abdomen, through which, by the struggles of the animal, a portion of the intestines and mesentery were soon protruded. I then brought part of the latter within the field of the microscope, and gently irritated it with the point of a pair of forceps, while Mr. Boraston, who has been much accustomed to the use of the microscope, and to delineate the objects it presented, observed the effects; the account of which I give in his own words, with engravings from the drawing he was so kind as to favour me with, representing the different stages of inflammation from its commencement to its height. That the reader may be assured Mr. Boraston's account is wholly unbiassed, it is proper to observe, that till after he described to me what he had observed in this experiment, he was unacquainted with the object I had in view in making it.

“ The large arteries and veins were too opaque to admit of my distinguishing the motion of the blood, but in the small vessels, which were more transparent, the circulation was easily observable, and I perceived the globules of the blood moving along with great rapidity, but not in sufficient quantity to give a red colour to the vessels. The appearance of a small portion of the mesentery on its first examination, is given at fig. 1.

“ After a few minutes exposure to the air, the vessels became visibly enlarged, and in some parts assumed a reddish colour, while the velocity of the blood was proportionably diminished.

“ As soon as a part of the mesentery, which lay within the field of observation and appeared almost colourless, was irritated with the point of a small pair of forceps, a red spot appeared, as in fig. 2. In a few seconds it increased in size, the adjacent parts of the vessels were distended, and, the current of blood becoming less rapid, was for some distance slightly tinged with a red colour, as represented in fig. 3.

“ This enlargement of the vessels gradually extended till the part presented the appearance of fig. 4. The circulation was at this time extremely languid, and at length was not discoverable at all. When, in this last stage, the motion of the blood



Fig. 1.



Fig. 2.

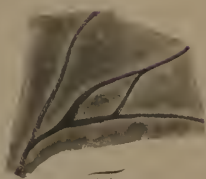


Fig. 3.



Fig. 4.

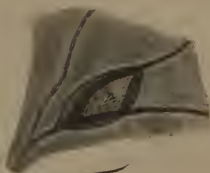


Fig. 5.

“ was entirely stopped, a reddish shade was seen to have diffused itself over those parts of the membrane contiguous to the inflamed vessels : see fig. 5.”

The reddish shade here mentioned, between the interstices of the vessels, was evidently owing to the irritation and distention having produced a slight rupture of some of the vessels, by which a small quantity of blood escaped.

It appears then, from the foregoing experiments, that the state of the capillaries in an inflamed part is that of preternatural distention and debility. That of the larger vessels may be determined without the aid of the microscope. Unassisted by glasses we readily perceive that they do not suffer a similar distention, and their increased pulsation sufficiently evinces their increased action. Nor is this increase of action so obscure as to be observed with difficulty ; I have often, in inflammatory affections of the jaw, applied the finger to the external maxillary artery, both where it passes over the bone, and after it assumes the name of labialis, and in rheumatic affections of the head to the temporal arteries, and perceived them beating with unusual force. I have frequently had occasion to mention an unusually strong action of the temporal arteries as a symptom of inflammation of the encephalon. The reader will find a variety of authors observing, that an unusually strong beating in the arteries supplying any part of the body indicates that inflammation, if not present, is about to begin in that part.

Such then appears from direct experiment to be the state of the vessels in an inflamed part, the capillaries distended and debilitated, the larger arteries excited to increased action. This being determined, we find no difficulty in explaining the phenomena of inflammation, the *modus operandi* of its causes, and of the means which relieve it.

In the first place, of the *ratio symptomatum* of inflammation.

The symptoms essential to inflammation, we have seen, are redness, swelling, increased temperature, and pain.

How difficult it is to account for the increased redness of an inflamed part by the popular doctrine, we have just seen ; or rather, (for what has been said amounts to as much) that were there no other fact to combat that hypothesis, this symptom alone is sufficient to invalidate it. With regard to the late doctrine of inflammation, on the contrary, increased redness of an inflamed part is a consequence too evident to require any comment.

We shall also see why the redness is of the florid kind, and assumes a purplish hue, where there is a tendency to gangrene ; but of this presently.

To account for the swelling of an inflamed part by the com-

monly received hypothesis, it is asserted that inflammation is always accompanied by effusion into the cellular substance, for it is impossible even to conceive how a more vigorous action of the vessels can occasion their general dilatation. Of this mode of explaining the swelling, it may, in the first place, be observed, that it has never been shewn that any degree of effusion necessarily attends inflammation; but admitting that it does, the swelling should be white as in anasarca, not red, for we most certainly know that there is no effusion of red blood. Besides, on examining an inflamed part through the microscope by transmitted light, it is at once evident that its increased size is, at least in great part, occasioned by vessels turgid with red blood.

Nay, on the common hypothesis, it is even difficult, as Dr. Fowler confesses,* to account for the pain of an inflamed part, which is doubtless the consequence of the preternatural distention of the capillaries, and which is often pulsatory corresponding with the pulsation of the larger arteries which, being in a state of increased excitement, tend at every contraction farther to dilate the capillaries, the sensibility of which is increased by the unusual accumulation of arterious blood, for the whole blood of an inflamed part, we shall find, in what is called active inflammation, is arterious. The pain remits in proportion as the blood becomes venous, which only happens in proportion as a tendency to gangrene supervenes.

The increased temperature we shall find no less a consequence of the debility of the capillaries. This symptom which we have reason to believe first suggested the popular hypothesis, now that the former erroneous opinions respecting the cause of animal temperature are refuted, is wholly inexplicable upon that hypothesis.

To prove that this symptom is as strong an argument in favour of the *late* doctrine of inflammation as any of the others, it is only necessary to refer to the chemical discoveries respecting the cause of animal temperature. To those who are acquainted with these discoveries it is almost superfluous to point out why debility of the vessels of any part, and consequent accumulation of blood in it, is attended with increased temperature. The motion of the blood, so far from being the cause of animal temperature, does not even seem to promote the evolution of caloric from the blood, which takes place as readily, the blood being arterial, when it stagnates in its vessels, as when propelled through them with its greatest velocity.

It therefore follows that, where there is an accumulation of arterial blood, there must also be an increase of temperature.

It may be urged as an objection to this, and at first sight it ap-

* P. 24.

appears a considerable objection, that if the velocity of the blood in an inflamed part be much diminished, it will not sufficiently undergo the change necessary for the evolution of caloric, since it is not sent through the lungs so frequently as the blood supplying parts where the circulation is more rapid; and if the inflammation be an internal one, we cannot suppose the blood to undergo this change in consequence of any process taking place on the surface.* But it appears from a variety of observations, that although the temperature of an inflamed part is increased, any portion of its blood must evolve less caloric than the same quantity of blood in a healthy part.

The experiments of Dr. Crawford, Dr. Fordyce, Mr. Hunter, and others, prove that in proportion as the temperature is increased, the evolution of caloric from the blood is diminished; and, that when the temperature is raised but a very little higher than the natural degree, it ceases altogether. Whatever therefore be the accumulation of blood in any part, no more caloric can be evolved than is sufficient to raise the temperature to this degree. Hence it is, that although in an inflamed part a greater quantity than usual of caloric is evolved, yet each portion of blood evolves less than in a sound part. The temperature to which an accumulation of blood in the part is capable of raising it being limited, it is evident, that the greater the accumulation of blood, the less caloric will be evolved from each portion of it.

It is farther to be observed, that although the blood continues to evolve caloric till it arrives at this temperature, yet each portion constantly evolve less, the nearer it approaches to it.† To place what is here said in a clearer point of view, suppose that a quantity of blood as 49, evolves a quantity of caloric capable of raising temperature of the part to 98° , and suppose 100° the highest temperature in which blood evolves caloric, then if this part, instead of being supplied with a quantity of blood as 49, be supplied with a quantity as 50, the temperature of the part will not be increased to 100° , which ought to be the case, making allowance for the increased size of the part, if each portion of blood evolved the same quantity of caloric as when the temperature was at 98° . But the temperature of the part being increased we shall suppose to $98^{\circ} 30'$, each portion evolves less caloric. Then suppose a quantity of blood as 60, supplied, and that this quantity evolves caloric sufficient to raise the temperature to 100° , it is then evident that, although the temperature of the part is raised, yet each portion of the blood evolves less cal-

* It has been found by experiment that the blood undergoes the same change, though in a less degree, on the surface of the body as in the lungs.

† See the experiments of Dr. Crawford, by which he shews that the higher the temperature in which the animal is placed, the less caloric is evolved from the blood.

oric than when the temperature was $98^{\circ} 30'$. It is also evident, that after the temperature is increased to 100° , that is, as high as it can be raised by the blood, the only effect of every fresh portion of blood accumulated in the part will be to diminish the quantity of caloric supplied by every other, by supplying part of that which raises the temperature to 100 .

From all which it is evident, that the greater the quantity of blood accumulated in any part, the less is the waste of that principle, whatever it be, by means of which caloric is evolved and therefore that, if it receives a much less supply of this principle, it also requires a much less supply of it. The waste of this principle in the whole inflamed part is greater than it was when the part was sound ; but the waste of it in any particular portion of its blood is less. But it is only in proportion to the waste of this principle, that the blood assumes the venous colour ; hence the florid appearance of an inflamed part.

It appears from some experiments of Mr. Hunter on the temperature of inflamed parts, that it is much lower than, from what we perceive by the sense of touch in external inflammations, we should be inclined to suppose. Mr. Hunter found that it did not at any time exceed the temperature at the heart, so that, according to these experiments, inflammation did not produce a greater evolution of caloric than is capable of raising parts at some distance from this organ, but not immediately exposed to the influence of the air, about one degree. He made his experiments on various animals, the temperature of whose blood at the heart was various, and declares he constantly found the result as here stated. According to these experiments then, the additional caloric evolved in an inflamed part is only one in 97 or 98. Now if we suppose the quantity of blood in an inflamed part only double of that in the sound part, (and I have no hesitation in saying, from what I have observed with the assistance of the microscope, that it is often at least ten times as much) the waste of that principle by which the blood evolves caloric must be diminished about one half, allowance being made for the increased size of the part ; or so nearly one half, that the difference may be overlooked.

It seems probable however, that Mr. Hunter's experiments were not quite accurate, we know that the blood is capable of evolving caloric at rather a higher temperature than that stated by him ; but this allowed, the above statement is nearly accurate, the blood certainly ceasing to evolve caloric at a temperature a very few degrees higher.

Admitting that the temperature may be raised four degrees, the statement will then be thus : a quantity of blood as 1, gives 98 ; as 2, gives 102. In the latter instance the same quantity of blood supplies little more than half the quantity of caloric, that is allowing for the increased size of the part.

But the quantity of blood in the inflamed part is at least ten times that in the sound part. Then supposing the size of the part doubled, which is surely as much as it is in most inflammations, we shall have the following proportions.

The quantity of blood increased as	10
The size of the part increased as	2
The proportional quantity of blood therefore increased as	5

Thus we have a quantity of blood as 1, giving a quantity of caloric capable of raising the part to 98° ; and a quantity of blood as 5, only raising a part of the same size to 102° .

According to this, a very rude,* but I believe, moderate statement, the waste of the principle by which caloric is evolved from the blood in an inflamed part, is about five times less than in the same part when sound; so that we readily account for both the increased temperature and arterial colour of the former, although the rapidity of the circulation is greatly lessened.

But may not the rapidity of the circulation, it may be said, be so much lessened as not to be compensated for in this way? When the circulation ceases altogether, as in the most inflamed parts in the foregoing experiments, when consequently there can be no supply of that principle by which caloric is evolved from the blood, what then preserves the increased temperature and florid colour of the part? The increased temperature and florid colour then disappear; the temperature sinks, the part assumes a purplish hue, and soon dies, that is, becomes gangrenous.

As soon as it was determined that the change which the blood undergoes in the course of circulation is a principal source of animal temperature, we might a priori have determined, that the evolution of caloric from the blood is diminished in proportion as the temperature is increased.

On the supposition that the change induced on the blood is the only source of animal temperature, and we certainly do not err much by making this supposition, if it evolved the same quantity of caloric at all temperatures, the temperature of any part would be directly as the quantity of blood circulating in it,

* It is evidently impossible in this case to arrive at perfect accuracy, as we can neither determine exactly how much the quantity of blood, or size of the part is increased. All that can be looked for is, to be assured that we err on the safe side, and do not assume too much. There is every reason to believe, that the quantity of blood in an inflamed part is often more than ten times that which circulates in it while sound. Another circumstance which must be a cause of some inaccuracy in such a statement is, that the change which takes place in the blood is not the only source of animal temperature, many of the secreted fluids having a less capacity for caloric than the blood. It could easily be shown however, that the error occasioned by this circumstance is too inconsiderable to be taken into account.

and inversely as its bulk, the rapidity of the circulation being supposed the same. One consequence of this would have been, that the temperature of cert in parts, the brain for instance, in which so large a proportion of blood circulates, would have been considerably higher than that of others.

It appears from what has just been said, that although the unusual supply of blood to such parts may raise the temperature a little, yet its chief effect is that of preserving the blood more in the arterial state, the arterial blood appearing to be particularly favourable to certain functions of the body.

Did not the evolution of caloric cease at a certain temperature, every scratch must have proved a sore capable of terminating existence in excruciating pain. For then the temperature of a part being nearly as the quantity of blood it contains, and inversely as its size, and the quantity of blood in an inflamed part being increased in a so much greater proportion than its size, the temperature must often have been sufficient to destroy the texture of the finer parts wherever the inflammation spread.

One symptom of inflammation still remains to be considered, which is not indeed mentioned in the definition, as, however remarkable, in many cases it is often distinguished with difficulty, namely, the increased pulsation of the larger arteries of the part, and in the Phlegmasiæ, of the heart and whole arterial system.

The final cause of this symptom is sufficiently evident; as the inflamed vessels are debilitated, an increase of the *vis a tergo* is at once a means of promoting the circulation in the part, and stimulating the debilitated vessels to action. Thus we find, that wherever the *vis a tergo* is much diminished, the circulation in an inflamed part is apt to fail altogether, and gangrene to supervene. We shall find indeed that gangrene is often the consequence of the *vis a tergo* being too great, and consequently overstretching the vessels of the inflamed part; so that a principal object in the treatment of inflammation is to regulate the *vis a tergo*, neither permitting it to fall too low or become too powerful.

But although there is no difficulty in perceiving the final cause of the symptom we are considering, the efficient cause is involved in obscurity. The increased action of the arteries in the vicinity of an inflamed part, may in some measure depend on the increased stimulus, from the impediment to the passage of the blood through the debilitated vessels. But when more distant vessels, and particularly when the whole system is affected, we cannot attribute it to this cause, especially when we reflect that the slightest inflammation of an important viscus, the stomach for instance, will excite fever, while a very extensive inflammation in the skin or muscles is often unattended by this

effect. We are forced therefore, for an explanation of the phenomena, to look to the nervous system, which connects the most distant parts of the body and conveys impressions from one to the other. But to trace the changes which take place in it, and the manner in which these excite the larger arteries in inflammation, is as impossible as to trace the changes produced in it by an emetic, and the manner in which they excite the action of the abdominal muscles and diaphragm. Neither in the case of vomiting nor inflammation can we detect the changes induced on the nervous system; but if what has been said be just, we understand the nature of the one operation, as well as that of the other, and both as well as we probably ever shall understand them.

I might now shew in what manner the operation of the remote causes is explicable on the doctrine of inflammation we are considering, and consequently tend to support it. But when we recollect that it appears from the foregoing experiments, that whatever diminishes the action of the vessels of the part, occasions, and whatever increases it tends to cure, inflammation, the manner in which most of the remote causes act is too evident to require any explanation.

If inflammation depend on the diminished proportion of the power of the capillaries to the vis a tergo, it will, it is evident, be most apt to supervene under the three following circumstances. 1. In a state of plethora, because then all the vessels are overdistended, and consequently any cause tending farther to distend any of them, whether it be a cause debilitating them, or increasing the vis a tergo, will be more felt than in health. 2. In a state of general debility, because then the vital powers in any part are more readily destroyed than in health. 3. In a state of general excitement, because then the vis a tergo is every where strong, and consequently apt to occasion distension of the vessels wherever any degree of debility occurs. These are the states of the system, it has been observed above, which are found to predispose to inflammation. In the first and last the inflammation is generally of that kind which has been termed active, the vis a tergo is considerable, the larger arteries being readily excited to increased action. In the second of the above states what is termed passive inflammation is most common, the larger arteries, in proportion as the system is debilitated, being less readily excited.

The greater the general debility, the greater, it is evident, must be the partial debility before inflammation can take place, because, however debilitated the vessels of any part may be, inflammation will not supervene if the vis a tergo is debilitated in the same proportion; hence the partial debility in such cases must be very great, and consequently the inflammation will soon run to gangrene, as happens in the inflammations so readily ex-

cited in typhus, &c. Nay in cases of extreme debility an injured part runs to gangrene almost without any symptom of inflammation, the *vis a tergo* being too feeble to distend the vessels, however much debilitated. The reader I hope will admit that it is unnecessary to dwell any longer on this part of the subject.

May we not conclude from what has been said, not to speak of a variety of other facts which will occur as we proceed to support the same opinion, that inflammation arises from debility induced on the capillaries, the consequence of which is that the larger arteries of the part, and sometimes of the whole system are excited to increased action, in order to correct this morbid state, in the same way in which the diaphragm and abdominal muscles are excited by an emetic, in order to expel the morbid contents of the stomach? And it is as easy to perceive how the one, as the other, set of motions act; for if we can remove inflammation by stimulating the vessels by distilled spirits, may it not also be removed by an increased *vis a tergo*?

Here it may be objected, that an increased *vis a tergo*, so far from being a means of cure, appears, from what has been said, to be a principal cause of inflammation. It appears, from what has been said that inflammation may arise either from a debility of the capillaries, or an increased *vis a tergo*. If from the latter cause, it can only be cured by diminishing the *vis a tergo*, which is lessened in proportion as the excitability of the larger arteries is diminished by their excessive action, or as we diminish it by means we are immediately to consider. But when the inflammation arises from the debility of the capillaries, the *vis a tergo*, it is true, also sometimes becomes too powerful, but are we not often obliged to have recourse to means which increase it, to bark and wine, and would not means to increase the *vis a tergo* be necessary in all cases of inflammation which originate from debility of the part, did not the nature of the system itself supply them; for if the vessels of an inflamed part can no longer be excited to due action by the usual *vis a tergo*, is there a means more proper to excite them than in increasing the stimulus on which their action at all times depends? But will not increasing the *vis a tergo*, it may be said, farther distend and debilitate? It certainly must farther distend, but whether that farther distention farther debilitates, or excites to action, must depend on the degree of excitability which remains in the vessels.

Of the Terminations of Inflammation.

The most common terminations of inflammation are, Resolution, Suppuration, and Gangrene.

Of the first there is little to be added to what has been said. We have seen in the foregoing experiments that, in proportion as we succeed in exciting the capillaries of an inflamed part to

action, we relieve the inflammation. When an inflammation is cured by resolution, that is, without the destruction of any of the parts it occupies, the vis a tergo has succeeded in exciting the capillaries to action. Resolution is often promoted by an effusion from the inflamed vessels, for when the vessels are so much debilitated by distension that the only effect of the vis a tergo is farther to distend them, there is no hope of exciting them to action without diminishing the volume of fluid which distends them. The fluid discharged in such cases is often serum or coagulable lymph. If the inflammation has its seat in a secreting organ, its secretion is generally increased, and sometimes, particularly on secreting surfaces, the fluid discharged we shall find is a true pus, for it will appear that the formation of pus is not uniformly, though generally, attended with a destruction of parts. Whether the termination by a secretion of pus,* the texture of the parts remaining entire, deserves the name of suppuration or resolution, it is of little consequence to enquire. It belongs to the latter according to the definitions which I adopt.†

The resolution of inflammation is sometimes promoted by a discharge, not from the part itself, but some other, often from a neighbouring secreting organ, sometimes, particularly where the whole system is affected, by a discharge of blood in consequence of the rupture of vessels in some of those parts of the system where they are most numerous and delicate, the internal nares, lungs, &c.

When inflammation terminates by suppuration, there is a destruction of a certain portion of the inflamed part, in consequence of which a cavity, termed an abscess, is formed, which from the first is filled with pus, the quantity of which increases in proportion as the cavity enlarges.

It has been a prevalent opinion, that pus is nothing more than serum discharged during the inflammation, and changed by stagnation. The experiments however of Sir John Pringle,‡ and of Mr. Gaber,|| at one time regarded as conclusive, it is now generally admitted, do not warrant the inferences of these writers.

Brugman, in the first section of the second chapter of his *Puogenia*, has ascertained that the sediment from the serum is not the same with purulent matter. “*Nec juvat unum alterumve prædicatum habuisse commune, aut externo habitu quodammodo convenire. Quid enim inde, nonne et crenor lacis varia*

* We shall presently have occasion to consider the nature of this fluid.

† It was once supposed that pus is never formed without the destruction of parts, but this opinion, we shall find, succeeding observation has proved to be unfounded.

‡ The Appendix to Sir John Pringle's work on the Diseases of the Army.

|| *Miscell. Taurin.* vol. ii.

"cum pure communia habet? Utrumque album est viscidum
"blandissimumque."

In the second section Brugman compares pus with the coagulable lymph of the blood, in the third with the buffy coat, in the fourth with the muscular fibre, in the fifth with fat; and from all his experiments concludes, "*Naturam corruptione vel partium*" "*qualiuncumque putredine tanquam medio in creando pure non*" "*ui.*" This inference is confirmed by the observations of Mr. Home,* who made a set of experiments, to ascertain the different steps of the formation of pus.

He found pus formed by means of a blistering plaster in twenty hours; by means of the microscope he from time to time examined the discharge while it was changed from a colourless fluid into pus. In another experiment he found that pus is formed by irritating the urethra in the short space of five hours. and that in half an hour the discharge begins to assume the purulent appearance.

He also found that it has not this appearance, which is occasioned we shall find by the presence of globules, when it is first poured out, but acquires it while it remains on the inflamed surface, and that this change takes place as readily, although the matter discharged be removed while it still remains colourless, provided the proper temperature be preserved, as when it remains on the part. The change to the purulent appearance is promoted by exposure to the air.

Mr. Hunter was led, from the phenomena of inflammation, to regard pus as a secreted fluid. He found vessels formed in extravasated blood and lymph, and supposes that in the extravasated lymph, which precedes the formation of pus in wounds, a system of vessels is formed for the secretion of this fluid.

Mr. Home adduces several facts to countenance this opinion. In performing the operation for strangulated hernia, he observed the intestines smooth and polished, an inflammation supervened and speedily proved fatal, and the body was opened within twenty-four hours after the operation. On various parts of the inflamed intestines, whose surface the day before had been uniformly smooth, there were found small quantities of extravasated lymph in which vessels were formed. Pus, he observes, is more readily formed by secreting surfaces, on the skin for example and in the urethra than in the body of a muscle. Many proofs of the tendency of secreting surfaces to form pus will occur in considering the Phlegmasiæ. The part in which pus is about to be formed assumes a more vascular appearance, that is, more of the appearance of a gland; and pus bears much resemblance to some secreted fluids, particularly milk and the pancreatic juice.

* A Treatise entitled, "On the Properties of Pus, by Everard Home."

But independently of these reasons, which Mr. Home justly considers as favourable to the opinion, if it can be shewn that pus is different from any of the component parts of the blood, and that neither these nor the solids are by any spontaneous change convertible into pus, the only opinion we can form is, that pus is a secreted fluid. What other proof have we of the nature of many secreted fluids, for the separation of which the glandular structure is at least as obscure as in the case of suppuration?

But the manner in which pus is produced is of less consequence than a criterion to distinguish it from other fluids, which in some cases, we shall find, an object of the first importance.

Chemical analysis, it is probable, will never enable us to distinguish pus with sufficient ease to render the distinction useful. Most animal substances, when chemically analysed, give very similar results. Other means of distinguishing pus have therefore been looked for.

Brugman,* Mr. Darwin,† and others have attempted to distinguish it by its chemical properties. To determine, however, with certainty the presence of pus by their criteria, supposing them accurate, requires more experimental nicety than is possessed by the generality of practitioners. The most useful tests, as far as I am capable of judging, are those proposed by Mr. Hunter:‡ Its coagulation by sal ammoniac, and globular appearance through the microscope. If to these we add some of the most remarkable of its other properties, we shall seldom be at a loss to distinguish it.

The following is the selection made by Mr. Home. Pus is of the consistence of cream, its colour is whitish, it has a maukish taste. When cold it is inodorous, when warm it has a peculiar smell. Examined by the microscope it consists of semi-opake globules, and a transparent colourless fluid, which is coagulated by sal ammoniac. Pus may be evaporated to dryness without coagulating. Its specific gravity is greater than that of water. It does not putrify readily. It is not readily diffused in cold water. In warm water it is readily diffused, and remains diffused after it cools.

Mucus is the fluid from which it is of most consequence to distinguish pus, which may, for the most part, be readily done by the foregoing properties. With respect to the test most commonly employed for this purpose, derived from the specific gravity of the two fluids, it is very fallacious. The specific gravity of the mucus of those cavities to which the air is not admitted, is

* Brugman's Puogenia.

† Experiments determining a criterion between mucilaginous and putrescent matter, by Mr. Charles Darwin.

‡ See Mr. Home's paper, just alluded to.

greater than that of water,* and even in those to which the air has free access, if allowed to stagnate, by which its thinner parts are absorbed, it becomes so ; thus it is not uncommon, as I have often observed, for the expectoration of mucus in the morning, when it has lain during the night in the trachea and its branches, to sink in water ; and on the other hand, when pus, which is specifically heavier than water, has entangled small globules of air, which frequently happens in that which comes from the lungs, it will remain suspended in water.†

From the animal fluids, which bear a greater resemblance to pus, Mr. Home points out the following means of distinguishing it.

From chyle it differs in its globules being larger, and in its not coagulating by exposure to air and a high temperature.

The globules of the pancreatic juice are smaller than those of pus.

Solutions of animal matters contain flakes instead of globules, or at the same time with globules.

The globules of milk are nearly of the same size with those of pus, but much more numerous. Milk coagulates by runnet ; pus does not. Milk contains oil and sugar which are not found in pus.

Pus is distinguished from the discharge from ill conditioned ulcers, by the latter containing flakes ; from the thin matter of blisters, by this containing neither flakes nor globules. It is also a property of pus that it separates readily from the sore, discovering granulations on the places it covered.

It has been the opinion of some, that pus may be formed without previous inflammation. This opinion Mr. Home combats, and observes that the matter discharged where there had been little or no previous inflammation, differs materially from true pus. Instead of being globular, it has a curd-like appearance, and contains flakes.

The formation of proper pus seems to depend much on the state of the circulation in the part, and in the system in general. The author just mentioned found that, *cet. par.* pus is more apt to degenerate the farther it is from the heart, and relates a striking instance, in which a cause affecting the whole system produced at one time a sudden alteration in the matter of the sores, of no less than twenty patients. From a sudden change of weather, instead of a well formed pus, coagulable lymph was spread over their surface like melted tallow, adhering to it with such

* Mr. Darwin's paper above alluded to.

† "Corrosive sublimate coagulates mucus but not pus." Mr. Darwin's paper on pus and mucus.

force that it could not be separated without injury. I have seen a similar instance. Few indeed have attended hospitals without meeting with such.

The discharge from ill conditioned sores is very various. Instead of coagulable lymph or a flaky discharge, they often pour out a thin ichorous matter which, examined with the microscope, is found to contain few or no globules. It is often mixed with blood, probably in consequence of its eroding some of the small vessels.

Mr. Home made some experiments to determine whether pus, as some have supposed, is capable of eroding the animal solids, the result of which is, that the purer pus is, the less it has of this property, and that the purest pus is a very mild fluid.

When suppuration commences in an inflamed part, the pain and redness generally abate, the temperature falls nearer the healthy degree,* and the throbbing becomes more sensible. In the phlegmasiæ we shall find the commencement of suppuration indicated also by certain symptoms affecting the system in general.

The matter of an abscess is either absorbed or discharged, and in either case, if it is well conditioned, the cavity is gradually filled up by an operation of nature, which is termed granulation from the new parts appearing in the form of small red grains. When this process is most favourable, the granulations are of a florid red colour, and proceed in a regular manner till the cavity is accurately filled, its edges (if the matter of the abscess has been discharged externally) being even or nearly even with the sound skin.†

Although the cavity of a favourable abscess is always filled up, it is never with matter exactly similar to that which was destroyed. It is often, however, with such matter as is capable of performing the function of that which has been destroyed. Thus the matter formed in wounds of the skin, tendons, ligaments, bones and some other parts, performs the functions of these parts; sensation has sometimes been restored through a nerve which had been divided. The matter formed in wounds of muscles or glands appears to be wholly incapable of performing the office of these parts.‡

* When however the matter is confined by the less yielding parts of the body, the inflammatory symptoms often do not abate till it is discharged.

† When the granulation is too languid, it is to be promoted by the same means which promote a favourable secretion of pus. It is sometimes too luxuriant, forming irregular masses which project beyond the lips of the wound; it is necessary then to check the granulating process and destroy the projecting parts by escharotics. But for more particular information on this part of the subject I must refer to the works on surgery.

‡ See Mr. Moore's paper on the filling up of cavities, &c.

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F

The last of the more common terminations of inflammation is gangrene and mortification. The former of these may be regarded as a less degree of the latter. Under Dr. Cullen's seventh genus, (Phlogosis) he gives the following definition of gangrene,

"Post phlogosin, pars vivens, mollis, parum sensibilis, sæpe cum vesiculis ichorosis."

Such is the appearance which precedes mortification; the circulation soon fails altogether, the vessels are obliterated, or an ichorous and bloody matter runs from their relaxed extremities, and complete mortification soon ensues. Mortification, or, as it is termed by medical writers, sphacelus, is defined by Dr. Cullen,

"Post gangrænam pars nigricans, flaccida, facile lacerabilis, sine sensu vel calore, et cum fœtore carnis putridæ: vitio celes-riter serpente."

It happens however, especially in some cases where gangrene comes on without much previous inflammation, that the mortified part assumes a different appearance, becoming dry and hard, as, for example, in the sphacelus produced by caustic. It has then been termed necrosis, or the dry gangrene. As in the case of suppuration, gangrene in the phlegmasiæ is attended with a change in the state of the general symptoms, which will presently be considered.

The more moderate the different symptoms, the better is the chance of the inflammation terminating by resolution; when it is of the pustular kind and does not readily yield to proper remedies, or when erythematic if unusually obstinate and deep seated, there is reason to believe that it will terminate by suppuration. When the symptoms are very violent, especially if the inflammation is of the erythematic kind, we have reason to fear gangrene.

Resolution is always a favourable termination. Suppuration is also favourable if the inflammation be external and the habit good, but in internal inflammations we shall find it is generally to be dreaded. Internal gangrene is always fatal. It is only when the gangrene is external that medicine can avail, and then it often fails.

Such are the more common terminations of inflammation; the only one which remains to be mentioned is that by Schirrus, for with respect to that by hemorrhagy and other evacuations, I have considered them as coming under the head of resolution, they are to be regarded as nothing more than different means of promoting this termination.

"The schools," Dr. Cullen observes, "have generally marked a fourth termination of inflammation, which is by a schirrus,

“ or an indolent hardness of the part formerly affected with inflammation. This however is a rare occurrence, and does not seem to depend so much on the nature of inflammation, as upon the circumstances of the part affected. It is in glandular parts chiefly that schirrosity is observed, and it is probably owing to the parts readily admitting stagnation of the fluids. I have observed that inflammation seldom induces schirrus, but that this more commonly arises from other causes ; and when inflammation supervenes, which it is sooner or later apt to do, it does not so commonly increase as change the schirrosity into a kind of abscess. From these observations it does not seem necessary to take any farther notice of schirrus as a termination of inflammation.”

Other terminations or rather consequences of inflammation will be noticed as we proceed in considering the phlegmasiæ, depending, like schirrus, on the structure of the part, as palsy or rigidity of the muscular fibres, opacity of the cornea, &c.

Of the Treatment of Inflammation.

It appears from what has been said of the terminations of inflammation, that resolution is that which is to be wished for in all cases. But in inflammation unattended by fever, which is always external, suppuration is also a favourable termination, if the habit is good. The treatment of external inflammation, therefore divides itself into two parts ; the indications being, in the first instance, to procure resolution, or if this fails, to promote suppuration ; but as simple inflammation is generally a slight disease, considerable inflammations, though external, being always accompanied by fever, I shall not here enter fully into the mode of treatment.

Much has been said of the *modus operandi* of the means which promote resolution, all of which may be arranged under two heads.

1. Those which lessen the volume of fluid distending the debilitated vessels, either by directly abstracting part of that fluid, which is done by evacuating part of it, or by occasioning a congestion in some neighbouring part ; or by diminishing the *vis a tergo* which occasions the accumulation.

2. By the application of stimuli to the inflamed part, by which the debilitated vessels are excited to action.

How perfectly the operation of these means correspond with the foregoing doctrine of inflammation, need not be farther pointed out. It has generally been considered very explicable indeed on the old hypothesis ; but for the fallacy of that explanation it is only necessary to appeal to the foregoing experiments. It is true indeed that, did inflammation depend on a morbidly increased ac-

tion of the inflamed vessels, it would be relieved by abstracting part of the fluid which supports this action. But how shall we explain the effects of astringents and other stimuli applied to the inflamed part? These, we are told, exhaust the excitability of the inflamed vessels, and thus moderate their action. But it appears from the foregoing experiments, that the effect of these is that of increasing the action of the inflamed vessels, and that it is only in proportion as they have this effect that they relieve the inflammation.

There is only one case of simple inflammation which deserves much attention, almost the only one indeed in which the physician is ever consulted; namely, when it becomes habitual. It then often proves very obstinate, as in the case of pustules (pimples) or erythema affecting the face, or the latter affecting the hands or feet.

All the local remedies employed in other cases of inflammation are occasionally serviceable. These I shall frequently have occasion to mention, and shall at present therefore confine myself to such as seem peculiarly adapted to what may be termed the chronic cases of simple inflammation.

Pimples and other habitual inflammations of the face, although attended with no danger and little uneasiness, the patient is often more solicitous to have removed than more important complaints. For this purpose the metallic preparations are the most serviceable. Solutions of sugar of lead are often employed with success, but a weak solution of the corrosive sublimate appears to be the most powerful. I have repeatedly seen it successful in the most obstinate cases.

The removal of cutaneous inflammations however, which have become habitual, is often attended with danger. In several instances, in which the inflammation was removed by the application of a solution of corrosive sublimate to the part, I have known severe head-ache the consequence, and, in one instance, almost total blindness. In this case the inflammation was removed by what is termed Gowland's Lotion, the basis of which, it is said, is corrosive sublimate. In one patient the pimples returned, and the head-ache was wholly removed by abstaining from the use of the solution. But, although in the instance just alluded to, on discontinuing the use of the medicine, the inflammation in some degree returned, the sight continued greatly impaired. These solutions generally do not produce their effect till after repeated application.

Of the Local Affection of the Hæmorrhagiæ and Profluvia.

In these, as in the phlegmasiæ the local affections occasionally appear unaccompanied by fever. As however they form the principal part of the disease, they have obtained the same name, whe-

ther with or without fever. The one consists of an increase of some colourless excretion, the other of a flow of red blood ; and it is common, whether fever attend or not, to call the complaint hemorrhagy, catarrh, coryza, &c.

In a strict nosological point of view, however the same observations apply to these affections as to inflammations. They frequently exist without fever, and should therefore have appellations and a place in nosological systems to distinguish them from febrile diseases ; and when the reader is informed, that there are hardly two complaints more different in their modes of treatment than such affections when accompanied with fever, and when they are the only complaint, he will be surprised that this distinction has not been made.

To avoid the introduction of new terms, I shall use Hemorrhagy and Profluvium to express the local affections ; and to express the more complicated diseases, Febrile Hemorrhagies and Febrile Profluvia.

After what has been said of inflammation, a very few observations on the local affections, hemorrhagy and profluvium, will be sufficient. Like inflammation they are of two kinds, namely, that which is the consequence of local debility, and that which arises from an increased vis a tergo.

The debility and consequent relaxation may be so great as to permit the red blood to escape, as frequently happens in typhus or scurvy. In general, however, the effusion of red blood is the consequence of rupture, either from external violence or increased vis a tergo ; hence the frequency of hemorrhagy in synocha. And the vis a tergo being increased in consequence of local debility, as in the case of inflammation, the same cause, viz. the local debility, which renders the vessels subject to rupture, increases the force which distends them, till some vessel giving way the distention is relieved, the vessels recover their tone, and the inflammation ceases. Hence it is, that inflammation is often cured by a spontaneous hemorrhagy from the part ; and hence it is that more or less inflammation always precedes what is called active hemorrhagy, that is, spontaneous hemorrhagy in which the vis a tergo is greater than in health.

Thus the only difference between hemorrhagy and inflammation is, that in the former a vessel gives way, the flow of blood relieving the distended vessels in the same way that artificial blood-letting from the part is found to do. And in considering the phlegmasiæ we shall find how much more powerful a loss of blood from the part is in relieving inflammation than general blood-letting, a circumstance which has not been sufficiently attended to. By the one we diminish the vis a tergo, but by the other while we effect the same purpose, though generally in a

less degree, we effect another of still greater consequence in relieving the congestion in the inflamed part.

I believe few who have been engaged in practice will doubt that sufficiently to diminish the *vis a tergo* in inflammation, in order to effect by this means alone the cure of the local affection, often requires a greater loss of blood than the patient can bear, and that in other cases, although the consequences of this evacuation are not immediately alarming, yet he often falls a sacrifice to them, after the complaint for which the blood-letting was prescribed is removed. Besides, the debility of the inflamed part is sometimes such, that no diminution of the *vis a tergo* will enable the vessels sufficiently to recover their tone to expel the blood which distends them.

The different success I have experienced in the treatment of the phlegmasiæ since I trusted more to local, and less to general, blood-letting, prepared as I was to expect it, has surprised me. The application of a few leeches to the part, or to parts in its neighbourhood, has often effected without any sensible diminution of strength, more than I had reason to expect from copious general blood-letting.

Active hemorrhagy then, or the hæmorrhagiæ properly so called, are spontaneous evacuations of blood which relieve an inflammation, or a tendency to it or to what has been termed congestion, (accumulation of blood in the larger vessels) and in proportion as the hemorrhagy is profuse, the inflammation or congestion, we shall find, is inconsiderable.

Passive hemorrhagy is only a greater degree of that state which we term passive inflammation. When the vessels of a part are greatly debilitated at a time when the *vis a tergo*, from general feebleness, is much below the healthy degree, but still sufficient to distend the vessels of the debilitated part, passive inflammation ensues; that is, that kind of inflammation in which the local symptoms, as well as general excitement, are inconsiderable, the *vis a tergo* not being sufficient to distend the vessels to that degree which occasions the pain, temperature, and other symptoms of active inflammation.

But when the relaxation of the vessels is extreme, the blood oozes from their extremities, preventing its accumulation in the part, and consequently the symptoms of inflammation. Thus in bad forms of typhus any irritating cause readily excites languid inflammation of the stomach and intestines; but in extreme cases of typhus, instead of inflammation, dark coloured blood oozes from the sides of these cavities.

But if the relaxation is chiefly in the colourless vessels, and particularly in the exhalants, which frequently happens because the farther vessels are from the heart they are the more easily

debilitated, the discharge will be colourless, and this discharge increasing as the *vis a tergo* increases, prevents much inflammation by preventing congestion.

But should any cause debilitate the red vessels of the part, the smallest of which supply the *vis a tergo* to those which are still smaller, namely, the colourless vessels, then the serous discharge must cease, from the want of the *vis a tergo* which supports it, and the smaller red vessels, now debilitated, will be distended by the *vis a tergo* which impels the blood into them; that is, inflammation will supervene, as often happens from cold in gonorrhœa, coryza, catarrh, &c.; for it is to be remembered, that the heart supplies the *vis a tergo* to the larger arteries only, the *vis a tergo* to every set of vessels, whether arteries or veins, being supplied by those which immediately precede them in the course of circulation.

On the other hand, if the colourless discharge by which local congestion is prevented, be checked by powerful astringents, the congestion must soon extend to the red vessels and all the symptoms of inflammation will supervene, as often happens in gonorrhœa, catarrh, dysentery, &c. from astringent applications.

But if in such cases any of the red vessels give way, the flow of blood relieves the congestion, and the symptoms of inflammation are mitigated or disappear.

In the phenomena of symptomatic fevers we shall find all these observations fully illustrated.

It is evident from what has been said, that the local affections of the different orders of symptomatic fevers are of a similar nature, and we readily perceive why they are so readily convertible into each other as we find them to be.

Having now considered simple fever, and the different local affections of symptomatic fevers, we are prepared to take a view of the various combinations of these complaints which have been arranged under three heads, Phlegmasiæ, Hæmorrhagiæ, Febriles, and Profluvia Febrilia.

BOOK I.

OF THE PHLEGMASIÆ.

THE Phlegmasiæ are those symptomatic fevers in which the local affection is inflammation; when this is external it is known by the symptoms already laid before the reader; when it is internal, a fixed pain and lesion of function point out its seat. To prevent repetition it will be proper, before we enter on the particular species of the phlegmasiæ, to make some general observations on this order of disease.

CHAP. I.

Of the Symptoms of the Phlegmasiæ.

THE only mark of distinction which can be given between simple inflammation and the phlegmasiæ is the presence of fever in the latter. There is certainly some difference between a pimple and a boil, and between erythema of the face and erysipelas. And this difference in general is sufficiently evident; yet when we come to enumerate the symptoms, we find the general increase of temperature and frequent pulse the only ones to distinguish them. In both instances the symptoms of the local affection are redness, increased temperature, pain, and swelling, the only difference which can be pointed out being merely in degree.

We cannot therefore give any other account of the local affection of the phlegmasiæ than has been given of simple inflammation. Between the two sets of diseases the fever is a sufficient diagnosis, the want of any other is not therefore to be regretted.

The combinations of inflammation and fever are of three different kinds, to one of which only the term phlegmasiæ is applied; the others being of a nature very different from phlegmasiæ, and requiring very different modes of practice.

Inflammation and fever may be combined by a simple inflammation supervening on fever, as in the exanthemata; or they may be combined by the inflammation producing fever, as in the diseases we are about to consider, the phlegmasiæ; or by a phlegmasiæ (that is, the inflammation and the fever it occasions) supervening on simple fever.

The first of these is readily distinguished, by the appearance of the inflammation not aggravating the fever. The last is readily distinguished where the phlegmasiæ supervenes a considerable time after the commencement of the fever, as happened in many

epidemics alluded to in the first and second volumes of this work, in which inflammation of the stomach, bowels, brain, &c. supervened on intermittent or continued fever, or on the exanthemata, forming complaints essentially different, although they have not always been accurately distinguished, from the phlegmasiæ.

But when the phlegmasia supervenes soon after the commencement of the fever, the diagnosis, although still necessary in regulating the treatment of the complaint, is more difficult. All that can be said on this subject, as far as I am capable of judging, is, that wherever the fever appears unaccompanied by external inflammation, or any of those local affections which we are about to consider as denoting the presence of an internal inflammation, however early such symptoms may supervene, the case is to be regarded as a complication of fever and phlegmasia, whether they arise from the same causes or not.

This appears to be the only accurate view of the subject, for it must be granted that if the fever has lasted for a considerable time, some days for example, before the local affection appears, the case is complicated. If then it be asserted, that there are cases of phlegmasiæ in which the fever shews itself before the symptoms denoting the local affection, the question arises, how long may the fever last before the appearance of such symptoms, and the complaint be regarded as a simple case of phlegmasia? If we admit that to be a simple case in which the fever lasts a few hours, we must also admit that to be simple in which the fever lasts for some days, before the appearance of the local affection.

The truth is, that in the true phlegmasiæ both sets of symptoms, especially if the seat of the inflammation be internal, appear together. It is impossible to say which appears first, and it is evident, that if any degree of the local affection produces a corresponding degree of fever, the one cannot appear unattended by the other.

But if such is the case, it may be asked, how do we determine which is the primary affection? To this question the following circumstances readily afford an answer. The causes which induce fever, do not at the same time induce inflammation. In 19 cases out of 20 inflammation does not supervene on fever, and when it does it generally arrives from causes different from those which induced the fever. But if, on the other hand, inflammation, that is, such as attends the phlegmasiæ, be excited, fever is the constant attendant, and its degree is proportioned to that of the local affection.

Besides, as we succeed by local remedies in relieving the inflammation, we find that in precisely the same degree the febrile symptoms abate. If the inflammation be not terminated by resolution, but run on to some of the other terminations, the febrile symptoms are still found to correspond exactly to the changes which take place in the local affection, and so constant is this correspondence, that we can determine, from the state of the febrile

symptoms alone, in what way the inflammation is terminating, although the termination be induced by means whose action is wholly confined to the inflamed part.

If, then, fever is not necessarily attended with the inflammations which appear in the phlegmasiæ, if such inflammations are universally attended with fever, the degree and state of the inflammation regulating those of the febrile symptoms, the conclusion is, that in the phlegmasiæ (and the same mode of reasoning applies to the other symptomatic fevers) the local affection is the primary complaint. I have therefore mentioned the local affection in the first part of the character of symptomatic fevers; and Dr. Cullen seems to fall into an inaccuracy of some consequence when he mentions the febrile symptoms first in his characters of the phlegmasiæ, hæmorrhagiæ, and profluvia. It is from regarding the fever as the principal part of these diseases, that physicians have trusted so much to general, and so little to local, means in their modes of treatment.

This inaccuracy in Dr. Cullen's definition (for such I think it will appear from what will be said of symptomatic fevers) may be traced to the same source with others mentioned in the general Introduction. For since his method obliged him to arrange under one class idiopathic and symptomatic fevers, it induced him to give the latter as much the appearance of the former as possible, by mentioning in the first part of his definitions the febrile symptoms as if the most essential part of the disease.

Nay, it has even been maintained by some, that the local affection in the phlegmasiæ is the consequence of the general disease, and that when the inflammation proceeds merely from a local cause, the disease is not a true phlegmasia. Of this opinion it is unnecessary to say any thing at present, we shall soon meet with a sufficient number of facts to refute it.

In the phlegmasiæ, then, the local affection is the primary complaint, and it either appears before the febrile symptoms or at the same time with them. In considering the symptoms of the phlegmasiæ, then, it is proper to begin with the local symptoms.

When the inflammation in the phlegmasiæ is external, no other description can be given of it than that which has been given of simple inflammation. The inflamed part in both cases is affected with redness, pain, increased temperature, and swelling, these symptoms however, being more considerable in the former.

Like simple inflammation, the local affection of the phlegmasiæ may be divided into that in which the redness and swelling are diffused, and that in which they are circumscribed.

Although the line of distinction between the true simple inflammations and the phlegmasiæ is well marked, the one never running into the other, (we never see pimples or habitual erythema

of the face produce fever) yet there are some external inflammations which may be regarded as forming the link of connection between simple inflammations and the phlegmasiæ. Thus a small boil is unattended by fever, but if it be increased by local irritation for example, it then occasions fever, farther proving the fever in the phlegmasiæ to be the consequence of the inflammation.

It may be observed indeed of all the phlegmasiæ in which the inflammation is external, that in their symptoms, prognosis, and mode of treatment, they approach nearer to the nature of simple inflammation, than the other phlegmasiæ do. The fever is more moderate, the mode of treatment less vigorous, and the prognosis much better. In inflammations of those parts which can neither be regarded as wholly external or internal, the fauces, rectum, meatus auditorius, muscles, &c. the degree of fever and the prognosis are between these extremes.

Upon the whole it may be observed, that the nearer the seat of inflammation is to the brain or stomach, the more considerable the fever and the greater is the danger. Inflammations of the head are the more dangerous, the nearer they approach the brain, and inflammation of the brain is the most dangerous inflammation of the head. Inflammations of the trunk are the more dangerous, the nearer they approach the stomach. Inflammation of the œsophagus, for example, occasions a greater degree of fever, and is more dangerous than inflammation of the fauces; and inflammation of the duodenum than inflammation of the colon; and inflammation of the stomach is not only more dangerous than any of these, but also than inflammation of the lungs or of any other part of the trunk. Lastly, inflammations of the extremities are less dangerous than those of either the head or trunk.

We determine the presence of internal inflammation by certain symptoms which, from dissection after death it has been determined, always indicate this species of derangement. These symptoms are shortly enumerated in the above definition of the phlegmasiæ. "*Febris symptomatica, dolore topico, simul læsa partis internæ functione;*" and no farther account of these symptoms need be given, for wherever there is fixed pain, derangement of some internal function, and fever, we have reason to believe that local inflammation is present, which is placed beyond a doubt if the pulse be hard.

It appears from what was said of inflammation, that when it is present to a considerable extent, and at all times when it affects a vital organ, the whole sanguiferous system is excited to increased action, the final cause of which appears to be, to restore circulation in the debilitated part. The muscular fibres of the vessels, it was observed, run transversely, so that the effect of unusual action must be, that the vessels embrace their contents more forcibly, and consequently feel harder, and the difference between a strong pulse and a hard pulse seems to arise from the

artery in the latter case never being wholly relaxed, while in the strong pulse, however powerful the contraction may be during the systole, we have reason to believe that there is a complete relaxation during the diastole, so that the vessel forcibly embraces its contents only for an instant, and therefore feels soft.

In the case of the hard pulse, the end being to propel the blood into the debilitated vessels of the inflamed part, the arteries in the neighbourhood of these vessels forcibly embrace their contents, although in a less degree during the diastole, seemingly to prevent any degree of regurgitation, and at length the whole arterious system is affected in the same way, so that, however debilitated the circulation becomes, while the inflammation lasts, the hardness of the pulse is still remarkable, and by this means, we shall find, we may often detect the presence of inflammation when there is no other symptom to guide us.

But the foregoing symptoms not only leave no room to doubt the presence of inflammation, but also point out its seat. When we know the seat of the pain, as we know that of the different viscera, we conjecture which is affected; but when we, at the same time, observe what function is affected, the matter is generally placed beyond a doubt. Thus if the patient informs us that the pain is in the chest, we suspect the lungs to be the seat of the inflammation, but if, at the same time, we perceive the breathing to be difficult, and no other function more deranged than is usual in the same degree of fever, we no longer hesitate in pronouncing the disease to be inflammation of the lungs.

If along with these symptoms there are irregular motions of the heart, we *suspect* that the inflammation has spread to this organ or its membranes, and in proportion as this symptom or the difficulty of breathing is most considerable, we judge the chief seat of the inflammation to be in the one place or the other. If hiccup supervene, we suspect it has spread to the diaphragm. In like manner, when the patient tells us that the pain is in the region of the stomach, and he is distressed with thirst and incessant vomiting, we know that he labours under inflammation of the stomach; and so on.

But the manner in which we form our opinion respecting the seat of the inflammation, is not so simple in every case as in these which arises from the sympathy of parts, for it often happens, that although the inflammation is confined to one organ, yet the pain, and even derangement of function, extends to parts in its neighbourhood. Thus in inflammation of the kidneys, pain is often felt in the stomach, and its functions are often as much deranged as those of the inflamed part.

Nay, a pain is often felt in a distant part while there is no pain whatever referred to the part affected. In inflammations of the liver for example, the pain is sometimes confined to the right shoulder. It also sometimes happens, that the functions of neigh-

bouring parts are more obviously deranged than that of the part affected. In inflammation of the liver the patient is often attacked with dyspnœa and cough, or with vomiting, or with hiccup, while on dissection it is found that the liver alone was the seat of inflammation.

It is not meant that inflammation of the liver never spreads to these parts, occasioning such symptoms; this indeed, we shall find, is a frequent accident; but it is well known that the inflammation has not, in every case where the foregoing symptoms attend, spread to neighbouring parts.

In such cases, which we shall soon have occasion to consider at length, it is often very difficult to determine precisely the seat of the inflammation; sometimes we shall find it is impossible, but fortunately it is not always necessary, and a person well acquainted with the symptoms of the phlegmasiæ will never find himself at a loss to determine the seat of the inflammation with all the accuracy that is requisite in practice; for although neither the pain nor lesion of function is always observed in the part affected, yet both the one and the other are always the same or similar when the same part is affected, at least in the same degree, and in the affection of no other part does the same combination of symptoms occur. Thus some difficulty of breathing, sickness at stomach, or hiccup, with pain in the right shoulder, and a hard and frequent pulse, as certainly denote inflammation of the liver as if the pain were referred to this organ, and accompanied with an evident derangement of its function.

In some of the phlegmasiæ some other circumstances, particularly an increase of the pain on pressure, assist the diagnosis.

Dissection has ascertained, that in internal as in external inflammations the redness and swelling are either diffused, the latter being hardly perceptible, or more circumscribed, and the swelling considerable.

Such, in a general view, are the symptoms which attend the commencement and progress of the phlegmasiæ.

These, like simple inflammations, terminate by resolution, suppuration, or gangrene. The changes which take place in the inflamed part during these processes are the same as in simple inflammation.

The local symptoms indicating the resolution of internal inflammation, are the gradual abatement of the pain, and the restoration of the function of the inflamed part.*

When suppuration takes place, the pain, for the most part, also abates. It is sometimes kept up by the distention which the

* See what was said of the various evacuations which frequently attend the resolution of inflammation when speaking of simple inflammation.

collection of pus occasions ; as in external inflammations, the throbbing often becomes more remarkable during suppuration, or supervenes where it had not previously been perceived. The patient also feels a sense of weight where the collection of matter is considerable, and if the part is not very deeply seated, some degree of fluctuation may be perceived through the integuments.

The only local symptom which indicates the termination of internal inflammation by gangrene is the abatement or total ceasing of the pain.

It may also be observed, that as far as we judge of the tendency to these different terminations by the local symptoms, we form our judgment in the same way as in simple inflammation. When the pain and derangement of function are unusually obstinate, we have reason to expect suppuration ; when unusually violent, mortification. We shall find that our judgment in this respect is also influenced by the nature of the part affected, some of the internal organs, the stomach and intestines for example, being more liable to gangrene ; others, as the lungs and liver, to suppuration.

But in ascertaining the tendency of internal inflammations, as well as the manner in which they are actually terminating, we trust more to the general than the local symptoms.

When the fever is moderate, and yields readily to the means employed, we may always hope for resolution ; when this termination takes place, the fever abates with the local symptoms, and with them wholly disappears. When the febrile symptoms, though not very considerable, are obstinate, and either yield little to the remedies employed, or soon suffer a new exacerbation, we have reason to dread suppuration ; especially if the inflammation has its seat in those organs which are most liable to this termination.

When suppuration begins, the pulse gradually loses its hardness, and becomes fuller, but continues more frequent than natural, and at the same time more or less of a cold stage is formed, the chills often continuing or recurring for many hours or even days, and if the purulent matter is neither absorbed nor discharged, these symptoms are very generally, though we shall find not universally, followed by hectic fever ; a species of symptomatic fever, which we shall soon have occasion to consider at length. It is enough to observe here, that it is a fever consisting of evening exacerbations, and morning sweats which never bring complete or permanent relief. It is maintained by some, that two exacerbations in the day may generally be observed in this fever ; but of this afterwards.

If the abscess, instead of healing, continues to discharge matter, especially if the discharge is of an unfavourable kind, this fever continues till the patient gradually sinks under it. In this

way internal suppurations may prove fatal, or they may terminate life more suddenly by destroying some of the vital organs, or laying open some of the larger vessels, or by the abscess bursting into the cavity of the lungs and occasioning suffocation. If the matter is discharged and the sore heals, which sometimes happens even in internal suppurations, the patient is restored to health.

When in the phlegmasiæ, the febrile, as well as the local, symptoms are unusually violent, we dread mortification, especially if the inflammation has its seat in the parts most liable to this termination. In internal inflammations mortification is always fatal.

As soon as gangrene takes place, the pulse loses its hardness, and becomes very feeble, frequent, and often irregular. The debility is extreme, and the surface is bedewed with partial cold clammy sweats. So sudden and complete in many cases is the relief from pain when mortification supervenes, that the patient, for a short time, often believes himself well. A person acquainted with the nature of his disease, however, knows that a few hours must terminate his life; every doubt of which is soon removed by the rapidly increasing debility. But such is the tranquility of this period, that many, in such circumstances being made aware of their situation, have made their wills; for unless the inflammation has its seat in the brain, it is unusual for coma or delirium to supervene in the phlegmasiæ.

Mortification may take place however without a cessation of pain. When the mortification is confined to a small portion of the inflamed part, the pain may continue to the last, as happened in a case in which I found, on examining the abdominal viscera after death, almost every part of the intestines more or less inflamed, and a gangrenous spot about the size of a sixpence on the stomach.

In such cases it is very difficult to ascertain the presence of gangrene, particularly if the inflammation has its seat in the stomach and bowels, all inflammatory affections of which are attended with much debility from the commencement. To determine the presence of internal gangrene, however, is a point of little moment, as no remedy can avail.

In external gangrene, the presence of which is always readily ascertained, medicine is more serviceable.

Such is the general view of the symptoms of the phlegmasiæ. Considerable deviations from the ordinary course however frequently occur; thus, in some cases, particularly of inflammation of the lungs and liver, anxiety attends instead of pain, sometimes the pulse is not hard; this deviation however is rare, except there is an evident tendency to gangrene. Nay, it sometimes,

though very rarely, happens, that inflammation is present without producing any of its usual symptoms.

De Haen, Quarin* observes, met with a case of inflammation of the stomach which terminated in sphacelus, and yet the pulse, within a very short time of the patient's death, was natural. He felt no pain in the region of the stomach, nor were its functions at all deranged. Quarin refers to the works of Morgagni for a case of inflammation of the intestines unaccompanied with pain, and himself mentions a case of the same phlegmasia, in which, although the pain was acute, there was no fever.

CHAP. II.

Of the Causes of the Phlegmasia.

THE remote, as well as the proximate, causes of the phlegmasia are the same with those of simple inflammations. The difference of the phenomena, as appears from what has been said, depending not on any difference in kind, but on the different degree or extent of the inflammation, or the nature of the parts it occupies. For the causes of the phlegmasia therefore, the reader is referred to the Introduction to the Second Part.

CHAP. III.

Of the Treatment of the Phlegmasia.

THE treatment like the symptoms of the phlegmasia might be divided into two parts, the local and general; and these might be subdivided, according as our view is to procure resolution or suppuration. It will give a more connected view of the subject, however, to reverse this order, and divide the treatment into that which promotes resolution, and that requisite when suppuration is desirable; dividing the means employed in each case into local and general.

We are now, as it were, to survey a new field in the practice of medicine. The maxims on which the treatment of all the fevers we have hitherto considered, the idiopathic, is founded, are no longer applicable. In the phlegmasia we shall find, that the local affection often requires the most vigorous antiphlogistic means, while the excitement is below the healthy degree; and in regulating the employment of stimuli, it is still the state of the local affection that we keep in view.

* Quarin De Febris.

The most characteristic difference between the treatment of idiopathic fevers and the phlegmasiæ is, that in the latter we employ antiphlogistic means more liberally, and the stimulating plan more sparingly.

It is not meant that the unguarded employment of antiphlogistic means, particularly evacuations, is not attended with danger in the phlegmasiæ. Besides the danger of inducing a state of general debility, if we greatly weaken the vis a tergo, the circulation in the inflamed part may cease altogether, and gangrene ensue.

The accession of gangrene in the phlegmasiæ may be regarded as in some measure analogous to that of typhus in idiopathic fevers. The typhus, we have seen, may be rendered dangerous either by the excess of the previous excitement, or the unguarded use of antiphlogistic measures; in like manner gangrene in the phlegmasiæ is to be dreaded when the various symptoms denoting active inflammation run unusually high, and when antiphlogistic measures have been pushed very far. And as we have seen, that in the former case much judgment is often required to suit the treatment to the symptoms, that is, neither to permit the excitement to run too high, nor unnecessarily to reduce it; so in the phlegmasiæ, while we avoid the risk of gangrene by preventing the inflammatory symptoms from running too high, we must avoid the opposite extreme, lest the vis a tergo be so greatly reduced that it shall be unable to support any degree of circulation in the inflamed part. There is still another consequence to be feared from profuse evacuations in certain cases of the phlegmasiæ, namely, the acute degenerating into a chronic complaint, always more obstinate, and often more dangerous, than the complaint we endeavour to remove.

With regard to the manner in which we judge of the propriety of having recourse to evacuations in idiopathic fevers and the phlegmasiæ, it is very different. In idiopathic fevers, we found, we almost always, *cet. paribus*, proportion the evacuations to the degree of general excitement; in the phlegmasiæ we, *cet. paribus*, proportion the evacuations to the violence of the local affection, and we attend to the nature and degree of the febrile symptoms chiefly with a view to ascertain the state of that affection, and, as in some phlegmasiæ, the greater the general depression and debility, the more violent is the inflammation, we sometimes push antiphlogistic measures as far as can be done with safety, on account of the very symptoms, which, in idiopathic fevers, render the tonic plan indispensable. In some of the phlegmasiæ, we shall find that a weak and even irregular pulse indicates the necessity of liberal evacuations.

Such a state of depression, however, is to be carefully distinguished from debility, properly so called. Dr. Fordyce* is almost

* Dr. Fordyce's Dissertation on Fevers.

the only writer who makes this distinction with much accuracy ; yet there is none in the practice of medicine of more importance. The former is that species of debility which is occasioned by a sudden exertion, the latter, that occasioned by one more moderate but long continued ; the one is permanent, the other transitory. A depression of strength even to syncope may arise from the morbid contents of the stomach, and on the removal of these may cease in the space of half an hour. But debility, properly so called, is that which succeeds profuse evacuations or diseases of long continuance.

A careful distinction between these species of debility is in no case more necessary than in the phlegmasiæ. While in these complaints depression of strength, properly so called, never counterindicates evacuations, real debility often does. How they are to be distinguished in each case will appear as we proceed. They are chiefly distinguished by depression of strength coming on suddenly, and only attending inflammations of particular viscera ; while real debility almost always comes on slowly and may attend any of the phlegmasiæ if long protracted.

The extent to which the antiphlogistic plan of treatment is to be pushed in a great measure depends on the nature and seat of the inflammation ; if these are such that resolution is the only termination by which the patient can be saved, the evacuations should be more liberal than where suppuration also would be a favourable termination ; because, to procure a proper suppuration, a greater degree of general excitement than that most favourable to resolution, is requisite ; and it is sometimes better, particularly in external inflammations, to induce suppuration, than to debilitate the patient to the degree that would be necessary to procure resolution.

Such are the general maxims on which the treatment of the phlegmasiæ is founded ; it will be proper to consider more particularly the different means employed in these complaints.

Of the Treatment of the Phlegmasiæ when the view is to procure Resolution.

As resolution is the most favourable termination in all the phlegmasiæ, we always in the first place endeavour to procure this termination. It is only where we fail in this attempt, or find that it cannot succeed without inducing a degree of debility more to be feared than suppuration, that we endeavour to induce the latter.

We procure resolution,

1. By removing the remote causes if they still continue to act.
2. By diminishing the congestion in the inflamed part.

3. By diminishing the vis a tergo.

Of the first of these indications little need be said ; it is only necessary to be acquainted with the causes of inflammation, in order to remove them if they happen still to be applied.

Of the means of relieving the congestion in the inflamed part it will be necessary to speak at greater length.

These may be divided into two sets ; those which relieve the congestion by exciting the debilitated vessels, to expel part of their contents ; and those which directly remove part of these contents.

Of the first set, several have already been mentioned in speaking of simple inflammation. We shall have occasion to consider many more in speaking of the different phlegmasiæ. Among the metallic preparations most serviceable may be mentioned the blue and white vitriol, the lapis caliminaris, sugar of lead, and corrosive sublimate. They are used either by washing the inflamed part, or parts in its immediate neighbourhood, with solutions of them, or such solutions are made into poultices and kept applied to the parts. When the application is made to a neighbouring part, it seems to relieve the inflamed part in consequence of the sympathy which exists between all contiguous parts.

Many neutral salts, particularly nitre and sal ammoniac, are also employed with success. The same may be observed of alum and other astringents whether mineral or vegetable.

Among the chief applications derived from the vegetable kingdom are vinegar, distilled spirits, opium, some essential oils, particularly that of turpentine. Among the less powerful applications are some of the distilled waters, rose or plantain water, or any other possessed of some degree of astringency ; these are good menstrua for more powerful medicines. One of the most powerful of the means we are considering, is the application of cold, and it has been carried so far, that pounded ice and snow have been employed for moderating inflammation. But the application of cold water merely, either by lotion, or poultices frequently repeated, such as those composed of raw potatoes, or other succulent vegetables, is often effectual.

The means which act by evacuating part of the contents of the distended vessels are upon the whole more powerful ; these are of two kinds.

1. Such as relieve the distended vessels by debilitating those of some neighbouring part, in consequence of which, a congestion being formed there, that of the inflamed part is relieved.

The means belonging to this class are termed rubefacients, many of which, and the best means of employing them, we

shall have frequent occasion to consider. But these are more powerful if, at the same time that they excite inflammation, they occasion some evacuation. Blisters therefore are found the most successful rubefacients. The evacuation they occasion, however, is slow ; and it may be observed of local, as it was formerly observed of general, evacuations, that their effects are, *cet. par.* proportioned to the rapidity with which they are made.

2. The means therefore, which at once draw off a considerable portion of the blood distending the vessels of an inflamed part, are generally the most successful.

Of all the remedies employed in the phlegmasiæ there is no other perhaps so powerful, and so generally applicable, as local blood-letting, and when, as in visceral inflammations, we cannot let blood from the inflamed part itself, it often answers nearly as well to draw it from the skin in its immediate neighbourhood.

Local blood-letting is performed either by cupping or by leeches. The former has the advantage of acting as a rubefacient at the same time, and the cupping glasses are often applied as a rubefacient without the scarificator.

In most cases, however, leeches on several accounts are preferable. If the inflammation be external, leeches can be applied to the part, but even where the inflammation is internal, the blood can in general be more suddenly abstracted by a proper number of leeches, and they put the patient to much less trouble.

The principal inconvenience in the use of leeches arises from our not being able to limit with accuracy the quantity of blood lost. If few leeches are applied, the blood is slowly abstracted ; if many, the discharge after the removal of the leeches may be too copious ; a little lint with moderate pressure is generally sufficient to check the bleeding. Where these can be conveniently employed, it is the best plan to apply a considerable number of leeches ; where they cannot, the number must be smaller, and the flow of blood promoted by cloths dipped in warm water, and renewed as soon as they cool.

When either the excitement or the hardness of the pulse is considerable, the more stimulating of the foregoing means, blisters and rubefacients, are exceptionable, as might *a priori* have been supposed, since they occasion inflammation, which, in the phlegmasiæ, we have seen, is the cause both of the increased excitement and hard pulse. Wherever these symptoms are considerable, therefore, they are to be moderated by evacuations, before we have recourse to such means.

Such are the local remedies employed in the phlegmasiæ, and, in the mildest cases, with proper measures to remove any cause of irritation, they are often all that are necessary. In more severe cases however, general, as well as local, remedies must be

employed, and then the third indication is to direct our practice, namely, to diminish the *vis a tergo*.

This part of the treatment bears a greater resemblance to that of idiopathic fevers; the line of distinction however is still well defined. It is unnecessary to repeat what is the same in the treatment of both sets of diseases; for which I shall refer the reader to the first volume, confining myself to the circumstances in which they differ.

The management of the agents on which the natural and animal functions exclusively depend, is nearly the same as in idiopathic fevers.* What is to be said here, therefore, relates chiefly to those agents which support the vital functions, caloric and the circulating fluids.

As cold is a frequent cause of the phlegmasiæ, the reader will not be surprised to find, that it is never applied so freely in these complaints as in many idiopathic fevers. The opposite extreme however is not less pernicious; the temperature should be moderate, and the drink tepid.

The phlegmasiæ it has been observed, as well as idiopathic fevers, have their crises. When a tendency to sweat appears in the former, it is to be encouraged by more warmth than is advisable in idiopathic fevers. But even here the hot regimen is not to be pushed far; if the sweat does not flow readily it will probably be of little service.

The most important part of the treatment of the phlegmasiæ still remains to be considered, namely the diminution of the *vis a tergo* by evacuations. Were we at all times capable of taking from the inflamed part, or some part in its neighbourhood, with sufficient rapidity, the proper quantity of blood, there can be no doubt that this would be the most successful mode of blood-letting in the phlegmasiæ. In this class of diseases we have two objects in view from blood-letting, namely, to diminish the congestion in the inflamed part, which is best performed by blood-letting from the part, and to diminish the *vis a tergo*, which can only be effected by the loss of a considerable quantity of blood. But as the *vis a tergo* is supported by the inflammation, if the abstraction of blood be made in such a manner as serves at the same time the purpose both of local and general blood-letting, a less

* The slight differences which occur will be noticed in considering the phlegmasiæ separately. We shall then also have occasion to consider a circumstance which, though never a source of irritation in idiopathic fevers, in some of the phlegmasiæ appears to be a very material one. Breathing pure oxygen gas, it has been found, is capable of exciting inflammation of the lungs, (see the experiments of Lavoisier and others) and we have reason to believe, that the greater the proportion of oxygen in atmospheric air, the greater is its tendency to excite inflammation; but of this afterwards, in speaking of the cases to which it particularly applies.

loss of blood will answer the purpose. It is often difficult however, and sometimes impossible, to take the necessary quantity of blood from the part affected, or its neighbourhood; and then we must let blood from the arm as in idiopathic fevers. If, for example, the inflammation have its seat in the head, it is better to take the blood from the jugular vein than from the arm; but if it have its seat in the stomach, as there is no considerable vein which can be opened in the neighbourhood of this organ, we take blood from the vessel which is most convenient. The blood-letting can then only relieve the inflammation by diminishing the vis a tergo, and for this purpose it is of no consequence from what part of the body the blood is taken, provided it be from such a vessel, and with such an orifice, as shall permit it to be taken speedily.

In alarming cases it is sometimes advisable to let blood from both arms at the same time. The advantage of taking the blood as speedily as possible is the same in the phlegmasiæ as in idiopathic fevers.

It appears from what has been said of the maxims which regulate the treatment of the phlegmasiæ, that we determine the propriety of recommending blood-letting in these complaints, as well as the extent to which it is to be carried, by comparing the state of the general symptoms with the seat of the inflammation, which is determined, we have seen, by the local symptoms.

The presence of inflammation in most parts occasions general excitement. In such cases we judge of the degree of the inflammation by that of the excitement, and regulate the employment of blood-letting in the same way as in simple synocha, except that the same degree of excitement warrants a more copious evacuation, both because other means are less powerful in the phlegmasiæ, and because in these complaints the excitement is never so considerable, nor succeeded by so great a degree of typhus as frequently happens in idiopathic fevers.

To one part of this observation however, there is an exception in phrenitis, in which the excitement is often as high as in any case of fever. Between a violent degree of idiopathic synocha, and many cases of phrenitis, there is hardly any diagnosis, and hardly any difference in the mode of treatment. The two complaints, indeed, seem often to run into each other, a great degree of synocha frequently occasioning a real inflammation of the brain.

In this organ the effects of a generally increased action of the sanguiferous system must always be most felt, because the blood from it, being returned partly through membranous canals which are not capable of excitement, as all the other parts of the sanguiferous system are, the increase of the impetus of the blood towards the brain must bear a greater ratio to the increased velo-

city of its return than in any other part of the system. Hence it is, that all increased excitement of the sanguiferous system occasions turgescence in the head, which appears to be a provision of nature to fit us under certain circumstances for unusual exertions, for within certain limits, the more turgid the brain is, the more powerful are the animal functions; hence the effects of desire and rage, which by increasing the velocity of the circulation, increase our strength, both of mind and body, on many occasions where it is most necessary. In consequence of the valvular structure of the veins where they pass through muscles, the action of the muscles increases the velocity of the circulation. This, from the nature of the circulation in the head, occasions a degree of turgescence there, which by increasing the action of the brain, increases the power of the muscles. Thus, in our exertions, one part of the system supports another till the whole is exhausted, and thus it is the animal functions are often supported during a powerful exertion, the interruption of which is immediately followed by syncope. To return from this digression.

Inflammation of certain parts, it has been observed, instead of increased excitement, is attended by a state of general debility. In such cases so far from proportioning the evacuations to the degree of excitement, we employ them the more assiduously the greater and more sudden the diminution of strength, because from this we infer the inflammation to be the more violent.

In such cases indeed it often happens, that the circulation is so much weakened that it is very difficult to procure the proper quantity of blood, and sometimes indeed in a very short time it becomes impossible. In an inflammation of the stomach and bowels which had only lasted ten or twelve hours, I have ordered all the larger veins of both arms and both legs, and also the temporal artery to be opened, without being able to procure more than two or three ounces of blood.

The patient died within 24 hours from the commencement of the complaint. Such cases point out the necessity of having recourse to blood-letting at an early period.

But even where the inflammation is attended with increased excitement, and there can be no difficulty at any period of the inflammatory stage in taking the necessary quantity of blood, yet if resolution be the only favourable termination, the earliest employment of proper means is more necessary than in idiopathic fevers, because after a tendency to suppuration has come on, (and the same remark applies respecting a tendency to gangrene if the inflammation be internal) we have no means of preventing it.

The propriety of having immediate recourse to blood-letting then, in all the more alarming cases of the phlegmasiæ, is unquestionable; and in this most essential respect, therefore, the

practice in the phlegmasiæ is more uniform and simple than in idiopathic fevers.

This observation however applies only to the phlegmasiæ not complicated with other diseases. When they supervene on other diseases, or in habits debilitated by previous disease, the employment of blood-letting requires more caution and discernment. Cases of this kind we shall have occasion to consider more particularly in speaking of the phlegmasiæ separately; it is enough at present to observe, that experience has confirmed what, from the foregoing view of the proximate cause, might, *a priori*, have been supposed, that in such circumstances the indication is rather to relieve the congestion in the inflamed part than to diminish the *vis a tergo*, and consequently that we are rather to depend on local than general evacuations. I have seen general blood-letting in gastritis supervening on a very debilitated state of the system, serve no other purpose but that of hastening the fatal termination.

With the exception of such cases, then, to determine the presence of visceral inflammation and the propriety of blood-letting is the same thing. It requires more attention however to determine the extent to which it should be carried, and it is in vain (as some have attempted) to state the precise quantity of blood which must be lost to procure resolution in the different phlegmasiæ. It is true that some phlegmasiæ require more profuse evacuations than others, but the severity of the symptoms, and the strength of the patient, must always influence the treatment.

In visceral inflammations, we immediately have recourse to general blood-letting, because its effects are more speedy than those of any local evacuation. By general blood-letting, we at once diminish the *vis a tergo*, and hardly ever fail to procure more, or less relief.

But the vessels gradually adapting themselves to their contents, the *vis a tergo* often becomes as great as ever, and thus, when the inflammatory tendency is considerable, the patient often sinks under repeated general blood-lettings. Such is the general practice in visceral inflammations, as if the only indication were to diminish the *vis a tergo*. The congestion in the inflamed part which supports the *vis a tergo** is overlooked.

If one or two general blood-lettings remove a visceral inflammation, they are the most easy and expeditious means of cure, but wherever the symptoms require such a repetition of this remedy as gives reason to apprehend a dangerous degree of debility, we should always call in the aid of local evacuations, of which local blood-letting is the most powerful.

When therefore the symptoms do not yield to a second general

* See what was said of the proximate cause of inflammation.

blood-letting, we should, without loss of time, apply leeches, or the scarificator and cupping glasses, as near the part as possible, by which a repetition of the general blood-letting will often be prevented, and the extent to which it will be necessary to carry it, always diminished. It is commonly indeed judged necessary to apply a blister in the neighbourhood of the inflamed part, as soon as the vis a tergo has been moderated, but in applying the blister we should always have it in view, that local blood-letting, (for the most part a far more powerful remedy) may be requisite, and leave a part conveniently situated for the application of leeches or the cupping glass.

I believe it will generally be found, that a larger blister applied at a small distance will have the same effect with a smaller one applied nearer the inflamed part; but local blood-letting to be successful must always be near the part affected. A large blister applied between the shoulders will almost as certainly relieve inflammation of the eyes, as a smaller one applied to the temples; but we might in vain endeavour to relieve ophthalmia by leeches applied to the former part.

In cases where resolution is the only favourable termination, we are to repeat the local and general blood-lettings, trusting as much as possible to the former, and employing the latter only to such an extent as the state of the complaint absolutely requires, till the symptoms disappear, or those denoting the presence of supuration or gangrene take place.

It often happens, that after the vis a tergo has been sufficiently diminished by two or three general blood-lettings, the cure may be completed by local blood-letting alone, and when this is sufficient, which will be known by its effects, no other should be employed.

With respect to the quantity of blood taken at each blood-letting, in an adult of ordinary vigour labouring under visceral inflammation, 14 ounces is a moderate general blood-letting; a moderate local blood-letting is from four to six ounces; and both the one and the other will be the more effectual the earlier they are employed, and the more quickly the blood is taken.

With respect to the repetition of the blood-letting, it must be regulated by the effects of that which has been employed. If the symptoms return with diminished violence, a smaller blood-letting will be sufficient; if with equal violence, an evacuation equal to the first will be necessary; and if with increased violence, we must still proportion the evacuation to the state of the symptoms; and the quantity of blood which is sometimes lost, without fatal effects, in visceral inflammations, is astonishing.

There are two changes in the state of the pulse which we wish to obtain by blood-letting (whether local or general) in the phleg-

masiæ. The one is, where the pulse is too strong and full, that is the excitement too great, to reduce it; this only applies to those cases where the excitement is greater than natural; but it unfortunately happens, that we cannot employ blood-letting without still farther reducing the excitement, however low it may be. The second change is our aim, in all the phlegmasiæ, to remove the hardness of the pulse, and it is generally in proportion as it has this effect that blood-letting is about to be successful or otherwise, the reason of which will readily appear from what has been said of the nature of a hard pulse. When the blood-letting has greatly reduced the excitement, without removing the hardness of the pulse, the prognosis is bad. When evacuations have been pushed as far as they can be with safety, without removing this symptom, the prognosis is generally desperate. An extremely small and hard pulse, in those cases where the pulse is generally strong and full, is one of the worst symptoms, because while it indicates the necessity of evacuations to effect a cure, it informs us that the patient can no longer bear them.

Although in the phlegmasiæ we take more blood from the full and plethoric, than from those of an opposite habit, yet, in determining the quantity, we pay less attention to the habit than in the treatment of synochus, because the blood-letting, as appears from what has just been said, is more generally requisite in the phlegmasiæ, and the consequences to be dreaded from it in these complaints are less apt to supervene, than those to be dreaded from it in idiopathic fevers.

For similar reasons, in recommending venesection in the phlegmasiæ, we pay little attention to several of the other circumstances, which were enumerated in the first volume as demanding attention in the employment of this remedy in synocha, namely, the nature of the cause from which the complaint proceeds, the season and climate, and the nature of the prevailing diseases.

Some of the circumstances alluded to however must influence the employment of blood-letting in all cases. The period of the disease, and the effects of the blood-lettings which have been employed, I have already had occasion to mention; we are influenced also, as in idiopathic fevers, by the appearance of the blood which has been drawn. The age of the patient likewise demands attention; the younger he is, if not an adult, the same loss of blood will procure the greater effect. In the decline of life more is to be apprehended from venesection than at an earlier period, and then the older the patient is, it is the more dangerous.

Among the consequences to be dreaded from blood-letting in the phlegmasiæ, were mentioned its tendency to convert certain species of these into chronic complaints. In old age, when all the powers of the system become languid, this effect is particularly to be dreaded; a large proportion of old people, who are

attacked with inflammation of the lungs for example, die of what has been termed *peripneumonia notha*, and in them acute rheumatism often degenerates into chronic, which remains during life.

Such are the circumstances which influence the employment of blood-letting in the phlegmasiæ, and if what has just been said be compared with the observations made on catharsis in idiopathic fevers, the reader will readily perceive what part of those observations is applicable to the phlegmasiæ.

In proportion as the evacuation is made more slowly by purging than by blood-letting, the discharge must be greater to produce the same diminution of the *vis a tergo*. Are they the less stimulating parts of the blood which are drawn off by cathartics? If so, on this account also the discharge must be the greater. We are never therefore to substitute catharsis for venesection in the phlegmasiæ; but more or less catharsis is nevertheless almost universally useful in these complaints.

Every degree of irritation in the phlegmasiæ is particularly hurtful, and even that degree which attends the healthy state of the bowels must be lessened, the fæces should be of a thinner consistence, and discharged more frequently. Besides, the body is generally costive in the phlegmasiæ, so that cathartics are doubly necessary. Although cathartics are much less effectual than blood-letting in directly diminishing the *vis a tergo*, yet, when they act by relieving the congestion in the inflamed part, the cause of the increased *vis a tergo*, their effects may be even greater than those of a moderate blood-letting; thus it is, that in all inflammatory affections of the alimentary canal, catharsis is of essential service, and were it not that we are obliged to irritate the inflamed parts, in order to procure the discharge, it is probable, that in such cases it might often be found more serviceable than venesection.

From the manner in which the vessels of the head and trunk are connected, we can hardly more effectually relieve those of the former, than by abstracting part of the contents of the latter; hence it is, that the depletion of the vessels of the head often goes so far as to produce syncope, from profuse evacuations by the bowels; hence also, we easily explain the turgescence of the vessels of the head, with the various complaints it occasions, previous to an attack of hemorrhoids, and the immediate relief and pale countenance which follows the discharge from the hemorrhoidal vessels. We might therefore, a priori, venture to affirm, that in inflammations of the head a copious discharge from the intestines would be found one of the best remedies, and experience has ascertained that venesection itself is often less powerful.

In all inflammations of the head therefore, a cathartic, we shall find, is the first means we have recourse to.

With respect to the evacuation by emetics, it is less generally, though often very useful in the phlegmasiæ. It is sometimes of service by evacuating the morbid contents of the stomach, more frequently by promoting a discharge by the skin. In some of the phlegmasiæ it is otherwise serviceable, and in some it is in every case inadmissible. In inflammation of the pharynx, larynx, and trachea, for example, we shall find it one of the best of remedies; in inflammation of the encephalon, one of the most powerful means of aggravating the disease.

Diaphoretics are less generally useful in the phlegmasiæ than in idiopathic fevers, most of the phlegmasiæ, indeed, are diseases too dangerous and powerful for such feeble means. To this observation however, we shall find one or two exceptions, which deserve particular notice; and in all the phlegmasiæ proper diaphoretics and more powerful remedies.

It has not been sufficiently attended to in the treatment of the phlegmasiæ, that evacuations are not the only means we possess of diminishing the vis a tergo. The erect posture, nausea, and certain medicines have this effect.

It is sometimes adviseable in the phlegmasiæ, when the patient is too weak to bear a considerable loss of blood, to place him in the erect posture while the blood is taken, by which a tendency to syncope will be induced by a small loss of blood, and a temporary, perhaps a permanent relief obtained. This I have heard a physician of experience say he had tried with success.

Nausea, it is evident, acts in a similar manner, and a trial of it might certainly be made with safety.

Of the medicines which have the power of diminishing the vis a tergo. one has lately demanded much attention (the Digitalis.) There have been various opinions respecting its mode of action; we shall have occasion to consider it more particularly when we speak of the complaints in which it has been employed; and it will appear, I think, that the benefit derived from it is to be attributed to its diminishing the vis a tergo. If this be the case, might not the cicuta, and other medicines possessing similar properties, be used with perhaps equal or greater advantage?

Of the Treatment of the Phlegmasiæ when the view is to procure Suppuration.

When the symptoms either do not remit on the use of proper remedies, or constantly return with the same, or greater violence, we have little hopes of procuring resolution.

In commencing the treatment of any of the phlegmasiæ, we

should consider whether if we fail to procure resolution, suppuration will be desirable. If so, we must not greatly reduce the strength, because, after the excitement is reduced to a certain degree, the more the system is debilitated, the less inflammations tend to suppuration and the more to gangrene. This is one reason why in external inflammations, and in inflammations of the fauces, we do not push antiphlogistic measures so far as in inflammations of the lungs, stomach, intestines, &c. and if in the former cases antiphlogistic measures have been pushed far in hopes of procuring resolution, in order to induce a favourable suppuration, we must often have recourse to means which increase the excitement.

It is not however to be inferred, that the presence of much excitement, and a great degree of inflammation, is favourable to suppuration. Although from the very commencement of a phlegmasia we had nothing in view but to procure suppuration, we should almost always find it necessary to employ to a greater or less extent the means for promoting resolution, in order to bring down the inflammation and general excitement to that degree which is most favourable to suppuration. "As in cases of certain effusions," Dr. Cullen observes,* "a suppuration is not only unavoidable but desirable; it may be supposed that most of the means of resolution formerly mentioned should be avoided, and accordingly our practice is commonly so directed. But as we observe on the one hand, that a certain degree of increased impetus, or of the original circumstances of inflammation, is requisite to produce a proper suppuration; so it is then especially necessary to avoid those means of resolution that may diminish too much the force of the circulation. And on the other hand, the impetus of the blood, when violent, is found to prevent the proper suppuration, so in such cases, although a tendency to suppuration may have begun, it may be proper to continue those means of resolution which moderate the force of the circulation." "On this account it is," Van Swieten† observes, "that we look upon an increased motion of the fluids as giving a tendency to suppuration; but it must at the same time be remembered, that too great a velocity of the fluids often suddenly ruptures the vessels, and does not procure a gradual separation of their extremities." (It is needless, after what has been said, to make any comment on these remains of the old theories of inflammation and suppuration.) "Whence," Van Swieten continues, "a gangrene follows instead of a favourable suppuration. A just medium therefore is requisite, we must support the motion of the fluids, so that they shall move more quickly than in health, but at the same time check the rapidity of their motion should it prove too violent."

* Dr. Cullen's First Lines, paragraph 270.

† Comment. in Aph. Boerhaavii.

In short, what constitutes the chief difference between the treatment for resolution and that for suppuration is, that in the former we endeavour entirely to remove, in the latter only to moderate, the inflammation.

The same principle regulates the employment of the local means.

While the inflammation is very considerable, attended with much pain and swelling, although we have no prospect of procuring resolution, we must have recourse to the same local means which are employed for this purpose ; they must not however be pushed so far. When, on the other hand, the inflammation is too languid, the local must still correspond with the general means. We must then, while by general remedies we increase the general excitement, by warm poultices and fomentations endeavour to support the inflammation.

It is a general opinion, that applications which clog the pores promote suppuration by preventing the exudation of the matter. This practice seems to have originated from the opinion of pus being formed by stagnation from some of the component parts of the blood. Such applications may be of use by increasing the heat of the part ; as they always have more or less of this effect, they are improper while the inflammation runs very high. Where the inflammation is too languid, their effects are increased by a stimulating quality. The unguentum basilicum, gum ammoniac, galbanum, and opoponax have been employed for this purpose. Such applications, as well as poultices and fomentations, can only be of much service when the inflammation is external or lies near the surface,* and then the treatment after suppuration rather comes under the province of the surgeon than physician.

When internal suppurations occur without immediately proving fatal, as frequently happens, the complaint comes under the care of the physician, because general rather than local means are then to be depended on. But the treatment of such suppurations is so much influenced by the nature of the part affected, that the consideration of them must be deferred till we speak of the different phlegmasiæ separately.

As an abscess increases, it is most enlarged on that side where the least resistance is opposed ; when it is situated near the surface, therefore, it always points externally, and the matter is readily discharged, which in general should be done by an artificial opening rather than by waiting for the slower operations of nature, that the hectic fever, consequent on the formation of

* Fomentations are sometimes of use in visceral inflammations, but we shall find that they are less serviceable in such cases than the older practitioners imagined.

considerable abscesses, may be of as short duration as possible. It may thus indeed, if the sides of the abscess unite readily, be wholly prevented. But when the abscess is deeply seated, or when, as in abscesses of the lungs, the greatest resistance is opposed on the external side, they point and burst internally.

It is always of consequence therefore, in forming the prognosis, to determine on which side of an abscess the least resistance is applied, and it sometimes influences the mode of treatment, for where there is reason to apprehend that the abscess will burst internally, in some cases it is advisable to attempt the evacuation of the matter by an external opening, although there is no appearance of pointing. This, we shall find, has often been practised with success in abscesses of some of the viscera.

The more perfect and unmixed the pus,* the more readily may we expect the abscess to heal, and the less injury will the habit sustain. It is therefore our view in promoting suppuration, to procure a pus of the most favourable kind. For answering this intention however, there are no other means than those which have been pointed out. The nearer the general excitement and the degree of the local affection approach to those best suited to promote suppuration, the more favourable will the suppuration be.

There is one case of suppuration which demands particular attention. When gangrene supervenes, if the case terminates favourably, it is by suppuration that the dead are separated from the living parts. It appears from what has been said, that the means of preventing gangrene, are on the one hand to prevent the general excitement and inflammation from running too high, and on the other from falling too low. In short, those states which are unfavourable to resolution or suppuration, tend to gangrene. On the means of preventing gangrene therefore nothing more need be said. It remains to make a few observations on the mode of treatment after it has supervened.

Is it from the different structure and situation of internal parts, or what may have more influence, from our not being able to ascertain the presence of gangrene in such parts till it has gone a considerable length, that when symptoms denoting the presence of gangrene in any of the viscera supervene, little or nothing can be done, although we generally have it more or less in our power to check the progress of external gangrene? Whatever influence these causes may have, this difference seems chiefly owing to a circumstance which has been sufficiently illustrated in detailing the symptoms and mode of treatment of the phlegmasiæ, namely, that the whole system partakes more of the affections of internal, than external parts. The slightest visceral in-

* See what was said of pus and the discharge from foul ulcers when speaking of the terminations of inflammation.

inflammation, it has been observed, occasions fever, and the different changes which take place in the local affection are indicated by corresponding changes in the state of the general symptoms; on the surface, on the contrary, a considerable degree of inflammation may exist and even run on to suppuration without being attended with symptoms of general derangement; so in the case of gangrene, when it is seated in external parts, the vigour of the system may still be such as to excite suppuration, and thus throw off the gangrened part; but when the gangrene is internal, the system in general partakes too much of the local affection to support this process, by which alone the progress of the gangrene may be stopped; besides, an external gangrene gradually impairs the vigour of the system, whereas the effects of an internal gangrene, owing to the strong sympathy which exists among all the more important parts of the system, are so sudden that there is hardly time for even attempting a cure. This is the less to be regretted, because the injury done by internal gangrene is generally such that a separation of the gangrened parts would only prolong the patient's sufferings.

Of gangrene of the throat and muscles it may be observed, as of inflammation of these parts, that the state of the system is neither so much affected by it as by the gangrene of more internal parts, nor so little as by that of the surface, and the prognosis is neither so bad as in the former case, nor so favourable as in the latter; farther demonstrating that the danger of gangrene is proportioned to the degree of sympathy which subsists between the system in general and the part affected.

It is only then when gangrene is seated on, or near the surface, that we can attempt the cure with any hopes of success.

The treatment may still be divided into general and local.

The general is nothing more than the mode of treatment employed in all stages of the disease when the inflammation is too languid, only in the case before us this mode of treatment is pushed to the utmost. The patient must be supported by a nourishing diet and a liberal use of wine, and the bark must be given in as large a quantity as the stomach will admit. To all this however there is one exception, when gangrene is the consequence of excessive inflammation it often appears while the general excitement runs high, and if the seat of the disease is external, the excitement sometimes continues high after the commencement of the gangrene, supporting the inflammation, and thus occasioning the gangrene to spread. In such cases it is evident that any means which increase the vis a tergo must promote the progress of the gangrene. "When the gangrene arises from the violence of inflammation," Dr. Cullen* observes, "the bark may not only fail in proving a remedy, but may do harm and its

* Dr. Cullen's First Lines, paragraph 272.

“ power as a tonic is especially suited to those cases of gangrene which proceed from an original loss of tone, as in the case of palsy and œdema ; or to those cases of inflammation where a loss of tone takes place while the original inflammatory symptoms are removed.”

When therefore gangrene proceeds from excess of inflammation and general excitement, we must delay the invigorating plan till the presence of the gangrene has reduced the morbid activity of the system, which soon happens, and in such cases considerable attention and nicety is often requisite, to determine the period at which the exhibition of the bark and wine should commence ; so that we shall neither do injury by recalling a state of excessive excitement, nor by permitting the debility to go farther than necessary. The best rule to go by perhaps is, as soon as the excitement is reduced to the natural degree, that is, as soon as the preternatural degree of fulness, strength, and hardness has left the pulse, to exhibit small doses of bark and wine, and be regulated by their effects.

With regard to the local remedies, they are all such as tend to excite the suppuration* by which the gangrened parts are to be thrown off; the only means of removing them except that by the knife, which is the best wherever it can be employed with safety. Among the applications found serviceable are many of those termed antiseptics, and it has been a prevalent opinion, that these act by checking, by their antiseptic power, the farther tendency to gangrene. But the same substances applied to parts wholly separated from the body will not have the same effect, at least in any considerable degree, nor are the best antiseptics best fitted for checking the progress of gangrene. Besides, whatever other effect they produce, they must tend to excite the powers employed in casting off the dead parts ; and as this alone accounts for their effects there is no occasion for any other supposition.

That they may have this effect they must be applied to parts which still retain some degree of excitability ; it is proper therefore, especially if the integuments remain entire, to make incisions through the gangrened part, previous to their application. Caloric is still one of the most powerful means of exciting suppuration, so that warm poultices, whatever be their composition provided they be soft and mild, are among the best applications. Some practitioners even recommend the application of warm bricks over the dressings† and they are prepared in Holland of various shapes for this and similar purposes.

In the advanced stages of gangrene, the application of heat and moisture has been deemed a more doubtful practice. The objec-

* I shall have occasion to mention a variety of these in considering the treatment of the different phlegmasiæ.

† Van Swieten's Comment. in Aph. Boerhaavii.

tion however appears to be founded on the same theory which ascribes so much to the antiseptic quality of the substances employed in gangrene.

The local treatment of gangrene belongs to the province of the surgeon ; I shall not therefore enter into it more particularly. There is one case however which deserves notice, as particularly illustrating a principle formerly considered at some length, namely, that the body is rendered morbidly sensible to any of the natural agents by interrupting its usual application or its application in the usual degree, without becoming more sensible to the action of other agents.

When caloric is so rapidly abstracted from any part that it falls below the temperature necessary to life, like other dead animal matter, it runs to putrefaction. Thus gangrene is frequent in cold climates in those parts of the body where the circulation is most languid, the fingers, toes, nose, ears, &c.

We should, *a priori*, expect that gangrene from this cause would be most effectually checked by increasing the temperature of the part ; and this has been confirmed by experience. Were we however at once to apply a temperature equal to the common temperature of the body, its effect would be that of spreading instead of checking the gangrene. Had not the parts in the neighbourhood of the gangrened part suffered from the application of cold, this practice might succeed ; but the due degree of caloric having been for some time abstracted from these parts, the usual temperature becomes an agent sufficiently powerful* to derange the mechanism on which life depends ; and as the phenomena are the same after life is destroyed, whether this be effected by too great an addition or too great an abstraction of caloric, the only effect of the sudden increase of temperature is that of making the gangrene spread.

The proper treatment therefore is to bring the part to the natural temperature by very slow degrees, and the first application is generally snow or iced water.

I have already had occasion to observe, that in cases of extreme debility gangrene often supervenes almost without any previous inflammation, the *vis a tergo* being too feeble to occasion much distention in the vessels of any part, however much debilitated. But did it happen that by any cause the vessels of a part, instead of being debilitated, which gives rise to inflammation, should be instantly deprived of all vital power, in this instance also whatever might be the state of the *vis a tergo*, gangrene would supervene with little or no previous inflammation. Accordingly this has sometimes though very rarely happened.†

* See vol. i. p. 196 and 197.

† A remarkable instance is related in the Philosophical Transactions

What has been delivered may be regarded as nearly the sum of all that is common in the symptoms, causes, and cure of the phlegmasiæ. We are now to consider the different species separately ; and notwithstanding the nature of all being the same, such we shall find is the difference arising from the function and situation of the parts affected by the inflammation, that there are hardly two diseases more different than some of these.

Different divisions of the phlegmasiæ have been proposed ; that most generally adopted appears on many accounts to be the best, namely, the division according to the different organs occupied by the inflammation.

It is true indeed that the inflammation may occupy the membranous or paranchimatous part of the organ,* and we know from dissection that the inflammation is often confined to the one part or the other. No parts of the body being more different in their structure, we should be inclined, a priori, to believe, that the symptoms of such inflammations would essentially differ, and require in some respects different modes of treatment. And in most writers the reader will find this distinction made, and even different names applied to the different inflammations of the same organ. Thus they point out the symptoms which distinguish inflammations of the brain from that of its membranes, terming the one Cephalitis or Sphacelismus, and the other Phrenitis. Thus they distinguish between Pleuritis, inflammation of the pleura ; and Peripneumonia, inflammation of the lungs ; and so on.

In paranchimatous inflammation, it is said, as the parts are soft and yield readily, the pain is never so acute nor the fever so violent as in membranous inflammation, where from the parts yielding with more difficulty the symptoms are necessarily more severe.

This hypothesis seemed confirmed, when it was observed that in most visceral inflammations the symptoms are sometimes of the one kind, sometimes of the other. The opinion therefore was implicitly received, by Sauvages, Linnæus, and others, whom I shall hereafter have occasion to mention, till dissections were made in order to ascertain its validity. The result was so far from being such as was expected, that the membranes were often found inflamed where there had been only symptoms of paranchimatous inflammation, and the paranchima was found inflamed where the symptoms had been those of membranous inflammation. Nay we shall find, when we consider the cases in which the distinction has been chiefly insisted upon, that where

for the year 1763. A poor family in Suffolk were attacked with gangrene without previous inflammation. Some died, others lost different parts, the feet or even the legs. No probable account of the cause is given.

* See a paper on the Phlegmasiæ by Dr. C. Smith, in the 2d vol. of the London Medical Communications.

symptoms of paranchimatus inflammation alone have been present, the membranes alone have been found affected, and vice versa. In short, from these dissections it appears that there are no symptoms by which we can distinguish the paranchimatus and membranous inflammations of any organ, nor is this to be regretted, since experience has proved the practice to be precisely the same in both cases. We can, for the most part, readily determine what organ is affected by the inflammation, and as this knowledge is all that is necessary for conducting the treatment of the complaint, we need not be solicitous for more.

It is unnecessary then to look for a more minute division of the phlegmasiæ than that adopted by Dr. Cullen, who, with a few exceptions afterwards to be pointed out, considers the inflammation of each organ a different disease, and arranges the whole under the three heads of *Cutaneous*, *Visceral*, and *Articular*.

CHAP. IV.

Of the Phlegmon.

IT was observed when speaking of simple inflammation, that there are but two species which can be well defined, the others appearing to be only varieties of these. The same observation applies to the cutaneous phlegmasiæ; the two species of which are termed by Dr. Cullen Phlegmon and Erythema, forming the seventh genus in his system of nosology, which he calls Phlogosis, and defines,

“Pyrexia, partis externæ rubor, calor, et tensio dolens.”

The first species of this genus, the Phlegmon, he defines,

“Phlogosis rubore vivido; tumore circumscripto, in fastigium plerumque elevato, sæpe in apostema abeunte; dolore sæpe pulsativum.”

The Erythema is defined,

“Phlogosis colore rubicundo, pressione evanescente; ambitu inæquali, serpente; tumore vix evidente, in cuticulæ squamulis, in phlyctænas vel vesiculas abeunte; dolore urente.”

Dr. Cullen, in his definition of phlogosis, (by which we are to understand an external inflammation causing fever) omits one of the characteristic symptoms of inflammation, the swelling. This is the consequence of the same inaccurate use of the term phlogosis, considered at length in the Introduction. Although pyrexia is the first word in the definition of phlogosis, (Dr. Cullen in this, as in other instances, being induced in order to defend his mode of arrangement, to give the phlegmasiæ as much as possible the appearance of idiopathic fevers) notwithstanding, I

say, pyrexia is the first word in Dr. Cullen's definition of phlogosis, yet he uses the term to express all species of cutaneous inflammations whether accompanied by fever or not, as appears both from there being no other place in his system of nosology for cutaneous inflammation unattended by fever, and from the manner in which he uses the term phlogosis in his definitions of the exanthemata and phlegmasiæ.*

Strictly speaking then the term phlogosis as used by Dr. Cullen, although he arranges under it only two species, includes four, two of which Dr. Cullen's mode of arrangement obliged him wholly to overlook. It not only includes the two phlegmasiæ the definitions of which have just been given, but it includes also the two species of simple inflammation considered in the Introduction to this part.

This Dr. Cullen was well aware of, and as far as his system admitted of it, he formed his definition of phlogosis accordingly. Why, it may be asked, is swelling excluded from the definition of phlogosis when it is mentioned in the definitions of the only two species arranged under it? The reason is, because, although the swelling is always sufficiently evident in those external inflammations which cause fever, in one species of simple inflammation, (the erythema) we have seen, it is often so slight as not to be observable.

Notwithstanding this, I have admitted tumor into the definition of simple inflammation, because although it is not always observable, yet it appears from what was said of the nature of inflammation, that it must always in some degree attend it, and in the above experiments, where it could not be discovered by the naked eye, it was always evident with the assistance of the microscope. But of the cutaneous *phlegmasiæ*, where the swelling is at all times so evident, it ought certainly to make part of the definition.

As there does not appear however to be any occasion for a generic name for the cutaneous phlegmasiæ, the two species being complaints nearly as different as almost any two of the phlegmasiæ, and in reality, although both external, not having their seat in the same parts, I shall abandon both the term phlogosis† and its definition. Were there no other reason for abandoning this term, the inaccurate manner in which it is used by Dr. Cullen, and by others who have adopted it from him, would be a sufficient one.

* Introduction, vol. i. p. 25.

† That Dr. Cullen was aware that his use of this term was not altogether accurate, appears from the following note. "Pro nomine generis cujus species est erythema minus recte in priore editione usurpatum fuit Phlegmone. Novum nomen necessarium nobis videbatur, et nihil aptius quam Phlogosis suppetebat." *Synopsis Nosologiæ Method.* v. ii. p. 83.

The phlegmon, Dr. Cullen's first species of phlogosis, then is, according to the arrangement I have adopted, the first species of the phlegmasiæ, and is therefore to be considered here. Of all the phlegmasiæ this is the least important, its symptoms are least varied, and its prognosis is most favourable. The only alteration I would propose on Dr. Cullen's definition of the phlegmon is merely to adapt it to the mode of arrangement I follow. It may be defined,

“Phlegmasia, rubore externo vivido; tumore circumscripto, in fastigium plerumque elevato, sæpe in apostema abeunte; dolore sæpe pulsatili.”

SECT. I.

Of the Symptoms of Phlegmon.

IT has already been remarked that the phlegmon does not differ from the pustule except in its being larger, the inflammation running higher, and frequently occasioning fever. What has been said of the pustule therefore, together with the definition of the phlegmon just given, comprehends all that need be said of the symptoms of the latter.

The phlegmon, in short, is a circumscribed red swelling rising to a point or nearly to a point, attended with a considerable degree of pain and a sense of distention and throbbing. The fever generally supervenes some time after the local affection, for the most part not till the latter has become considerable, and is always proportioned to it. The phlegmon rarely terminates by resolution, more rarely by gangrene, and the suppuration is generally of a favourable kind.

Dr. M'Bride* regards the phlegmon and boil as different, but the diagnosis which he proposes is too imperfect to afford grounds for such a distinction. When an inflammation is circumscribed, he observes, and deeply seated in the vessels of some fleshy part, the term for the disease is phlegmon. The furunculus or boil is an inflamed swelling more circumscribed and pointed than the phlegmon, very hard and painful, arising indifferently on all parts of the body.

Dr. Cullen regards this, as well as many of the other species admitted by authors, which it is needless to spend time in pointing out, merely as varieties of the phlegmon, which differs a little in its form on the same parts, and still more on different parts of the body. It may be doubted indeed of some of his varieties† whether they are properly arranged under phlegmon, but these

* Introduction to the Theory and Practice of Medicine.

† Culleni Synopsis Nosologiæ Method. v. ii, p. 84.

varieties coming under the province of the surgeon, it is not our business to consider them here. Many of these complaints evidently belong to the locales.

SECT. II.

Of the Causes of Phlegmon.

OF the causes of phlegmon there is little or nothing to be said in addition to what was said of those of the phlegmasiæ in general. In plethoric and vigorous habits its exciting causes are often so slight as to escape attention.

The chief seat of the phlegmon and pustule is the inner surface of the true skin and the cellular substance contiguous with it, from which it extends to the adjoining parts of the cellular membrane and skin, so that the surface generally soon assumes a florid colour, the tumor at the same time extending both in depth and circumference.

SECT. III.

Of the Treatment of Phlegmon.

ON this part of the subject also there is little more to be done, than to refer to what has been said of the phlegmasiæ in general. We may attempt the cure of phlegmon by resolution. As this mode of treatment however would generally be tedious, and after all that could be done would often fail to produce the desired effect, as suppuration in the phlegmon, properly so called, is always of a favourable kind, and lastly, as some cases of phlegmon, (those proceeding from extraneous matters introduced into, and irritating the skin) whatever relief be obtained by resolvents, must at length terminate by suppuration, it is upon the whole found the best plan from the first to promote this termination.

Both on this account and because the fever is seldom considerable, the more powerful antiphlogistic measures, particularly blood-letting, in most cases make no part of the treatment. It is sufficient that the fever be kept moderate by rest, dilution, and gentle laxatives.

With respect to the local treatment, if the inflammation run very high, it must be diminished by local blood-letting or by a blister applied to some neighbouring part, by which the congestion will be relieved, and by the latter, in consequence of the sympathy of parts, the inflamed vessels also excited to action; which may be farther done by diminishing the increase of temperature in the part, which tends farther to relax, by the repeat-

ed application of wet clothes, the effects of which are increased by dissolving in the water, nitre, sugar of lead, or other refrigerants.

When the inflammation does not run high, no local application is necessary, till, from the diminution of the pain and increase of the throbbing, there is reason to believe that suppuration has commenced, which is to be promoted by warm poultices and emollient fomentations. The matter should be discharged as soon as it is completely formed, and if the wound does not heal readily, the tonic plan is proper and should be continued till the patient is restored to health.

In some of Dr. Cullen's species of phlegmon, phymosis, paraphymosis, &c. other means are occasionally necessary, but for these I must refer to the works on surgery.

CHAP. V.

Of Erysipelas.

AS the erysipelas has been regarded as an exanthema, it has already fallen under our notice. It appears from what was said in the 342d and following pages of the first volume, that I use the term erysipelas in the same sense in which Dr. Cullen uses phlogosis erythema, his definition of which is given above.

Such is the confusion of terms in this part of medicine, that there are no less than three different affections, each of which has been known by the same appellations, and for each of which at least two appellations have been used indiscriminately.—Before we can speak of these diseases, it is necessary at least to know the meaning of the terms we employ. A chronic inflammation of the skin never occasioning fever, is termed by some writers erythema, by some erysipelas. by some the terms are used indiscriminately. The same terms have been applied with as little discrimination to another inflammation of the skin which is always a febrile disease, but which forms a complaint of a very different nature when complicated with simple fever; to which combination, however, the same terms erysipelas and erythema have been applied.

Dr. Cullen employs the term erythema to express the inflammation occasioning fever. By the term erysipelas he expresses the combination of the erythema and simple fever; and with respect to the simple inflammation, as there is no place for it in his system of nosology, he gives it no name.

In the passage just alluded to, I have pointed out the incon-

veniences resulting from this arrangement, and offered my reasons for using the terms in a different acceptation. The simple diffuse inflammation of the skin I have termed erythema; the phlegmasia, the diffuse inflammation of the skin occasioning fever, I have termed erysipelas; and with respect to the combination of erysipelas and simple fever, there is no more reason for giving it a name, than for giving a name to any other combination of two complaints.

The complaint I am now to consider then is the phlogosis erythema of Dr. Cullen, to which I confine the name of erysipelas. Dr. Cullen's definition of this complaint requires no other alteration than what is necessary to adapt it to the mode of arrangement followed in this treatise. The erysipelas may therefore be defined,

Phlegmasia rubore externo, pressione evanescente; ambitu inæquali, serpente; tumore vix evidente, in cuticulæ squamulas, in phlyctænas vel vesiculas abeunte; dolore urente.*

SECT. I.

Of the Symptoms of Erysipelas.

AS the combination of erysipelas and simple fever has been so generally regarded as an exanthema, and so constantly confounded with erysipelas according to the above use of the term, I found it necessary in considering eruptive fevers to treat of what has been termed the erysipelatous. In considering the nature of this fever, it was necessary to enter particularly into the symptoms of erysipelas. For this part of the subject therefore I must refer the reader to the first volume.

From what is there said, he will find that the erysipelas bears the same resemblance to the simple inflammation termed erythema, which the phlegmon does to that termed pustule. The only difference in both cases being, that in the phlegmasia the inflammation is generally of greater extent, its symptoms run higher, and it is attended with fever.

Such then are the four species of cuticular inflammation, the pustule and erythema which are merely local affections, the phlegmon and erysipelas which are febrile diseases.

* This definition does not include all the varieties enumerated by Dr. Cullen, some of which are merely local diseases.

SECT. II.

Of the Causes of Erysipelas.

IN determining the nature of the erysipelatous fever, it was necessary to consider the causes, as well as the symptoms, of erysipelas. For these also, therefore, I must refer the reader to the first volume ; he will there find that erysipelas arises from all the causes of the phlegmasiæ in general, and also from certain causes which affect the state of the skin, particularly derangement of the primæ viæ. Like the other phlegmasiæ, by leaving the part in a state of debility, it leaves behind it a predisposition to future attacks.

The chief seat of the erysipelas and erythema is the outer surface of the true skin and the corpus mucosum, but the former often spreads through the skin and affects the cellular substance beneath it.

Although it was necessary in order to place the nature of the erysipelatous fever in a clear point of view, to enter fully into the symptoms and causes of erysipelas, the treatment could not be laid before the reader till he was made acquainted with the principles on which the treatment of the phlegmasiæ is founded. On this part of the subject therefore I am now to enter.

SECT. III.

Of the Treatment of Erysipelas.

THE treatment of the different phlegmasiæ having much in common, it appeared the most concise plan to lay before the reader, previous to entering on the different species, the plan of treatment which may be regarded as common to them all, so that in considering the treatment of each separately, it will only be necessary to point out what is peculiar to it.

What is peculiar in the treatment of erysipelas depends chiefly on the seat of the inflammation being external.

It was observed of the phlegmasiæ in general, that the symptoms are more moderate, the prognosis better, and consequently the means required less vigorous, the more external the seat of the inflammation. On this account, in most cases of erysipelas, we do not find it necessary to have recourse to very vigorous antiphlogistic measures ; a cooling diet. an emetic at the commencement, and gentle saline laxatives, repeated so as to support a moderate catharsis, are generally sufficient, especially if the inflammation is confined to the extremities.

When the fever is considerable, diaphoretics, particularly antimonial should be exhibited. In this case the best plan appears to be, after the operation of a gentle emetic, to give one or two brisk saline cathartics according to the urgency of the symptoms, and then support a moderate catharsis by antimonials.

If the antimonials occasion sweating, they may fail to move the bowels. In this case we must be cautious not to check the sweating, (a frequent crisis in erysipelas*) which might be done by attempting to induce catharsis. While the sweating continues, therefore, the alvine discharge should be solicited only by emollient clysters repeated once, or at most twice, in the day.

The propriety of attempting the cure of erysipelas rather by catharsis than by blood-letting farther appears from the evident connection between erysipelas and the state of the *primæ viæ*, which was considered at length when speaking of the symptoms and causes of this complaint. Irritation of the stomach and bowels, we found, not only increases all the symptoms, but seems very frequently to be the exciting cause of erysipelas, so that a cathartic will often have a greater effect in removing it than any loss of blood which the patient can sustain.

Notwithstanding what has been said however, venesection† is still the best means of diminishing excessive excitement when we have, as far as lies in our power, removed the causes which produced it, and although in erysipelas a brisk cathartic, by removing the cause which produced or tends to support the complaint, will often have a greater effect than even copious blood-letting, yet if the first or second cathartic fail, a moderate venesection will have a much better effect than the continued repetition of powerful cathartics.

It is also to be observed, that although as the inflammation is external we do not, *cet. parib.* push antiphlogistic measures so far as in many other of the phlegmasiæ, yet as our view in erysipelas always is to procure resolution, erysipelas having little tendency to suppuration except when it spreads deep, and suppuration when it does occur in this complaint, being generally unfavourable, antiphlogistic measures should be carried farther than in the phlegmon.

While we endeavour to procure resolution, however, we must not forget the tendency of erysipelas to gangrene. If the habit is good indeed, any tendency to this which may appear is generally slight, and attended with little danger; but in debilitated habits, and particularly in those advanced in life, the gangrene, we have

* See vol. i.

† See the observations on the *modus operandi* of venesection, in the first volume.

seen, is apt to spread deep, and often proves fatal. In such cases therefore much caution is requisite.

What has been said of the treatment of erysipelas is rather applicable to that of the trunk and limbs than of the face. When neither coma nor delirium attends the latter indeed, which is not often the case, its treatment is the same as in erysipelas of other parts, with these differences, that on account of its tendency to affect the brain, the antiphlogistic means should be more powerful in proportion to the symptoms, and, as the seat of the inflammation is in the head, more is to be expected from catharsis,* after the removal of irritating matter from the *primæ viæ*, than in erysipelas of the trunk and extremities.

But when coma or delirium is present, the inflammation of the face is the least important part of the complaint. There is then always reason to believe, that the inflammation has attacked the brain,† and experience has pointed out that the treatment in such cases is the same as in phrenitis, the disease we are next to consider.

In laying down the treatment of the phlegmasiæ, I passed over in silence the employment of opium in these complaints which by some has been warmly recommended, because as there is much difference of opinion on this subject, it seemed better to defer any observations on it, till we came to consider the particular cases in which it has been recommended.

The indication in all the phlegmasiæ, we have seen, is to restore the proper balance of power between the vessels of the inflamed part and the *vis a tergo*. Now as in active inflammation, the *vis a tergo* is generally too powerful, especially if resolution is the termination we have in view, and as opium, for some time after it is received into the system, increases the force‡ of the circulation, we should, *a priori*, believe, that in most cases of the phlegmasiæ, it would be found pernicious. But as the *vis a tergo*, on the other hand, is often in a great measure supported by the pain and irritation of the local affection, opium, by allaying these, might even be the means of diminishing the *vis a tergo*. It appears from these observations, then, that the effects of opium in the phlegmasiæ are most to be dreaded where the *vis a tergo*, which is best measured by the hardness of the pulse,|| is, *cet. paribus*, greatest, and most benefit is to be expec-

* See the observations on catharsis in inflammations of the head, in the chapter on the treatment of the phlegmasiæ in general.

† See what is said on this part of the subject, in the section on the symptoms of erysipelas, in the first volume.

‡ See Dr. Crump's experiments on the pulse in his Treatise on opium, and a variety of other observations on this subject.

|| See what was said of a hard pulse, in the section on the symptoms of the phlegmasiæ. While the pulse is hard the blood is always propelled

ted from this medicine where the pain and irritation are proportionably most considerable. At the commencement of the phlegmasiæ, before the mass of blood has been lessened, the same cause will produce a greater increase of the vis a tergo than after the contents of the vessels have been diminished, then the pain and irritation often bearing a greater proportion to the vis a tergo, we may attempt allaying them at the risk of some temporary increase of the vis a tergo.

If we examine the result of experience in this part of the treatment, we shall find it coinciding with these observations. At the commencement of the phlegmasiæ before evacuations have been made, opium is found hurtful, but after we have reduced the vis a tergo, if the pain and irritation still remain considerable, it is generally attended with advantage to allay them by anodynes cautiously administered. I have repeatedly known them employed in this way with advantage, and, from what I have observed, I cannot help warmly dissenting from those who would strike opiates from the catalogue of medicines in the phlegmasiæ, or only employ them to procure sleep after almost every symptom has disappeared. It would appear, I think, that the use of opium may with much advantage be greatly extended in the practice both of medicine and surgery.*

It is also to be observed, that the temporary increase of vis a tergo occasioned by opium will be the less injurious in the phlegmasiæ, the less important the seat of the inflammation, and the less suppuration and gangrene are to be dreaded. Hence we may employ opium earlier in external than internal inflammations. We often see a complaint so trifling as a suppuration in the finger occasion sleepless nights and a considerable degree of fever, both of which may be prevented by a moderate dose of opium.

In erysipelas of the trunk and limbs then, after the vis a tergo is to a certain degree reduced, opium, with proper means to prevent its constipating effects, is a valuable medicine.†

In erysipelas of the face, even without coma or delirium, from the tendency of this form of the disease to affect the brain,

into the vessels of the inflamed part with a force greater than in due proportion to their strength, however great the general debility may be.

* Why may not a dose of opium be given previous to operations, since many surgeons give it liberally and with the best effects immediately after them? To what extent might such a practice be carried? It is surely worth while to endeavour by experiments, which might in the first instance be made on brute animals, to ascertain this point.

† A correspondent of Dr. Duncan observes, in the 12th volume of the Medical Commentaries, "In the common erysipelatous inflammation of the skin with a fever preceding and attending it, I in all cases use opium in the quantity of from a quarter of a grain to half a grain every 4 or 6 hours."

opium is a more doubtful remedy. For its exhibition in cases attended with coma or delirium I may refer to what is about to be said of inflammation of the brain.

Concerning the local remedies employed in erysipelas there is much difference of opinion. "As in this disease," Dr. Cullen observes, "there is always an external affection, and as in many instances there is no other; so various external applications to the part affected have been proposed; but almost all of them are of doubtful effect. The narcotic, refrigerant, and astringent applications are suspected of disposing to gangrene; spirituous applications seem to increase the inflammation, and all oily or watery applications seem to occasion its spreading. The application which seems most safe and which is now most commonly employed is that of a dry mealy powder frequently sprinkled on the inflamed parts." Many however, particularly foreign writers, are of a different opinion. Quarin,* Vogel,† and others dissuade indeed from solutions of lead, once much employed, and resinous and oily applications which they think tend to induce gangrene,‡ but they warmly recommend mild vegetable decoctions, particularly that of elder flowers in milk. Quarin even condemns all dry applications. Most of the external applications recommended in erysipelas, Burserius observes, if not hurtful are useless; he however advises the part to be kept moist with mild decoctions of marshmallows, &c. or with tepid milk. It is not improbable, I think, that as the erysipelas of different countries is found to differ in several respects, namely, its tendency to gangrene, to be accompanied by typhus, to attack particular parts of the body, &c. the same applications will not in every country be found the best. Most British practitioners agree with Dr. Cullen that a dry mealy powder is the best application; I have always seen it attended with good effects.

When the part is very tense, and there is reason to dread gangrene, Burserius recommends making incisions. These are also necessary when the inflammation has spread deep and a collection of matter is formed under the cutis vera.¶ When vesicles arise, Quarin advises them to be opened, that the acrid matter may not erode the parts beneath; the propriety of this practice may be questioned.

Such is the mode of treatment in the more common forms of erysipelas. The malignant erysipelas and the erysipelas infantum are the only forms of the disease to which the foregoing observations are not applicable.

* De Febribus.

† De Cog. et Cur. Morb.

‡ If erysipelas of the breast, Quarin observes, be treated with irritating applications, it often terminates in schirrus and even cancer.

¶ Vogel de Cog. et Cur. Morb.

I have already had occasion to make some observations on the treatment of erysipelas supervening on typhus, and it appears from the observations of Burserius, Quarin, and other foreign writers, that the treatment of malignant erysipelas, properly so called, is the same.

Burserius chiefly relies on the bark, Virginia snakeroot, camphire, and the sulphuric acid. To these Quarin adds scordium, and what we may venture to pronounce next to the bark the most valuable of all, wine. In malignant erysipelas however, the typhus is not always present from the beginning. It is therefore necessary where this form of the disease is known, to proceed with much caution at the commencement, and not push antiphlogistic measures farther than the state of the symptoms absolutely requires. What was said of the treatment in those idiopathic fevers which are apt suddenly to assume the form of typhus is with little change applicable here.

Anomalous cases occur in this as in almost all other diseases. We sometimes meet with cases of erysipelas attended with little general excitement, particularly the habitual erysipelas, in which, although there is no tendency to gangrene, the tonic plan proves most successful. Thus in the 16th volume of Dr. Duncan's Medical Commentaries the reader will find a case of erysipelas of the hands where the fever was slight, which was repeatedly removed by a free use of wine.

The erysipelas infantum is a form of the complaint which has not till lately demanded much attention. Hoffman seems to be the earliest writer who describes it. It has since been treated of by several writers, particularly by Dr. Underwood in his Treatise on the Diseases of Children, and by Dr. Bromfield and Dr. Garthshore in the second volume of the Medical Communications.

The tendency of the erysipelas infantum to gangrene pointed out the bark, and its effects seem fully to have answered expectation. There is no disease, Dr. Garthshore observes, in which the bark is more evidently beneficial. When it cannot be taken in sufficient quantity by the mouth, it must be given in clysters. To this medicine, with the addition of local applications, practitioners seem wholly to have trusted.

With regard to the local applications, farinaceous powders have been less employed in this than in other forms of erysipelas. They are not even mentioned by those who have been most conversant with the disease.

Dr. Bromfield recommends fomentations, spirituous embrocation, and emollient cataplasms. Dr. Garthshore also observes that he has found these applications beneficial. He recommends saturnine ointment and poultices. Saturnine poultices, he ob-

serves, generally removed the inflammation without the aid of the bark, but removed in this way from one part, it always attacked another ; at length, however, he trusted the cure wholly to the bark, and the common fomentation with a little soap dissolved in it ; and thought that saturnine applications were upon the whole prejudicial.

In the treatment of erysipelas infantum, as in all other forms of the disease, much attention should be paid to the state of the bowels. Clearing the primæ viæ should always make the first part of the treatment. The erysipelas infantum has, with much probability, been ascribed to some fault in the milk ; and it is asserted that the nurse's indulging in the use of spirituous liquors is often sufficient to occasion it.

I shall finish the account of erysipelas with the following observations of Tissot, respecting the means of preventing its return. Those subject to returns of erysipelas, he observes, should carefully avoid the use of milk,* cream, and all rich and viscid aliment, baked and strong meats, aromatics, strong wines, a sedentary life, strong affections of the mind, above all, rage, and, if possible, chagrin. Those who are subject to erysipelas should live chiefly on herbs, fruits, and other articles slightly acedent. They should drink water and some of the light white wines, and, above all, make frequent use of cream of tartar.

These precautions, he adds, are of the greater importance, because not to mention the danger from frequent returns of erysipelas, they denote slight affections of the liver or gall-bladder,† which, when neglected, often become serious.

CHAP. VI.

Of Phrenitis.

WERE it not that dissection has ascertained phrenitis to be an inflammation of the brain, there is hardly any thing in the symptoms which would have led the practitioner to distinguish it from an idiopathic fever. I have already had occasion to observe, that phrenitis differs from the other phlegmasiæ. The symptoms denoting the local affection are such as very frequently attend idiopathic fevers ; contrary to what happens in the other phlegmasiæ, it is generally accompanied with coma or deliri-

* With respect to the use of milk it can only be prejudicial when it impedes digestion. This indeed may be observed of all bland articles of diet. Whatever hurts the digestion is injurious. See what was said of dyspepsia, in the 1st, vol. b. i, ch. v, sect. 1.

† See the 1st vol. page 345.

um, and the excitement often runs as high, as in the most strongly marked synocha.

The causes of these peculiarities the reader will readily perceive. Simple fever consists in a general affection of the sanguiferous and nervous systems; to these in the phlegmasiæ are superadded certain local symptoms, pain, and the derangement of some of the functions. But when the inflammation is seated in the brain, on which sensation and motion in every part of the system depend, the symptoms of the local affection are not local, but general, symptoms. Hence the difficulty of finding a diagnosis between phrenitis and idiopathic fevers, which is farther increased by the latter, in the way above pointed out, often becoming a real phrenitis.

Whenever the velocity of the circulation is much increased, indeed, from the nature of the circulation in the head, there must always be a tendency to this complaint, or to congestion in the larger vessels. Hence head-ach, suffusion of face, inflammation of the eyes, bleeding from the nose, and other symptoms denoting preternatural distention of the vessels of the head, are among the most frequent symptoms of synocha.

Phrenitis is the third genus of Dr. Cullen's phlegmasiæ. The only alteration, which will be necessary on his definition, will be to adapt it to the mode of arrangement which I follow.

Phlegmasia dolore capitis, rubore faciei et oculorum, lucis et soni intolerantia, pervigilio, dilirio feroce vel typhomania.

I have already had occasion to allude to the division of this complaint into phrenitis, and cephalitis or sphacelismus. After what has been said, it is only necessary to observe here, that as we proceed in considering the symptoms, I shall point out those which characterize these different forms. The reader must recollect however, that different as these forms are, they do not point out the seat of the complaint to be different. The membranous or paranchimatus inflammation may be attended with either set of symptoms.

With regard to the circumstance which determines the complaint to assume the one form or the other, on comparing what has been said of the nature of inflammation with the symptoms of phrenitis, we shall have reason, I think, to believe, that phrenitis, properly so called, is the only real inflammation of the brain. The cephalitis or sphacelismus being merely a congestion in the larger vessels, and not essentially differing from apoplexy.

In all parts of the body a congestion in the larger vessels occasions comparatively little pain, little increase of temperature, and little fever. In short, the symptoms it occasions are precisely those of cephalitis, with the exception, that in this case the symptoms of oppressed brain are superadded.

In inflammation, that is, congestion in the capillaries, the pain is acute, and the increase of temperature and fever considerable.

This distinction will be found to account for many of the anomalous appearances referred to the phlegmasiæ, for dissectors have not accurately distinguished between congestion of the larger vessels and inflammation. Hence, in all probability, it is that we hear of inflammation of the stomach, bowels, &c. proving fatal without having been attended with either pain or fever.*

SECT. I.

Of the Symptoms of Phrenitis.

PHRENITIS often makes its attack with a sense of fullness in the head, flushing of the countenance, and redness of the eyes, the pulse being full, but in other respects natural. As these symptoms increase, the patient becomes restless, his sleep is disturbed or wholly forsakes him.

It sometimes comes on, as in the epidemic of which Saalman† gives an account, with pain, or a peculiar sense of uneasiness of the head, back, loins, and joints; in some cases with tremors of the limbs, and intolerable pains of the hands, feet, and legs. It now and then attacks with stupor and rigidity of the whole body; sometimes with anxiety, and a sense of tension referred to the breast, often accompanied with palpitation of the heart. Sometimes nausea and a painful sense of weight in the stomach are among the earliest symptoms. In other cases the patient is attacked with vomiting, or complains of the heart-burn, and gripping pains in the bowels.

When the reader reflects on the intimate connection which subsists between the brain and every part of the system, he will not be surprised to find the symptoms attending the commencement of phrenitis so various, and that the stomach in particular should suffer, which so remarkably sympathises with the brain. These symptoms assist in forming the diagnosis between phrenitis and synocha.

The pain of the head soon becomes more considerable, and sometimes very acute. "If the meninges," says Dr. Fordyce,‡ "are affected, the pain is acute; if the substance only, obtuse and sometimes but just sensible." And Dr. Cullen remarks, "I am here, as in other analogous cases, of opinion, that the

* See what was said of the anomalous appearances of the phlegmasiæ, towards the end of the first chapter of this book.

† Saalman's Observations on Phrenitis, in the *Acta Erudit. Lipsiensia*.

‡ Dr. Fordyce's Practice of Medicine.

“ symptoms above mentioned of an acute inflammation, always
 “ mark inflammations of membranous parts, and that an inflam-
 “ mation of paranchima or substance of viscera exhibits, at least
 “ commonly, a more chronic inflammation.”

It is unnecessary here to make any farther observations on this part of the subject. When we consider pneumonia, in which complaint the distinction has been chiefly insisted upon, and is still very generally admitted, I shall have occasion to enter upon it at greater length.

The seat of the pain is various, sometimes it seems to occupy the whole head ; sometimes, although more circumscribed, it is deep seated and ill-defined. In other cases it is felt principally in the forehead or occiput. The redness of the face and eyes generally increases with the pain, and there is often a sense of heat and throbbing in the head, the countenance acquiring a peculiar fierceness.

These symptoms for the most part do not last long before the patient begins to talk incoherently, and to shew other marks of delirium. Sometimes however, Saalman observes, delirium did not come on till the fifth, sixth, or seventh day.

The delirium gradually increases till it often arrives at a state of phrenzy. The face becomes turgid, the eyes stare, and seem as if starting from their sockets, tears and sometimes even blood* flowing from them ; the patient in many cases resembling a furious maniac, from whom it is often impossible to distinguish him, except by the shorter duration of his complaint.

The delirium assists in distinguishing phrenitis and synocha,† as it is not a common symptom in the latter. When delirium does attend synocha, however, it is of the same kind as in phrenitis.

We should, a priori, expect in phrenitis considerable derangement in the different organs of sense, which so immediately depend on the state of the brain. The eyes are incapable of bearing the light, and false vision, particularly that termed *muscæ volitantes*,‡ and flashes of light seeming to dart before the eyes, are frequent symptoms.

The hearing is often so acute, that the least noise is intolerable ; sometimes, on the other hand, the patient becomes deaf, and the deafness, Saalman observes, and morbid acuteness of

* Observations of Saalman.

† See Lobb's Practice of Medicine.

‡ It seems to be owing to this deception of the sight that the patient is often observed to pick the bed-clothes. This, however, I have observed he often does without directing his eyes to the bed-clothes, or indeed particularly to any object.

hearing sometimes alternate. Affections of the smell, taste, and touch are less observable.

As the organs of sense are not frequently deranged in synocha, the foregoing symptoms farther assist the diagnosis between this complaint and phrenitis.

The pulse is not always so much disturbed at an early period, as we should expect from the violence of the other symptoms compared with what we observe in idiopathic fevers. When this circumstance is distinctly marked, it forms perhaps the best diagnosis between phrenitis and synocha, and gives to phrenitis more of the appearance of mania. "*Interea exurgit febris nunc levis nunc intensa, nec semper morbi impetui consona, adeo ut sola diuturnitate discrepare videatur hoc delirii genus a mania, quam contumaciorem esse nemo nescit.*"*

In many cases however, the fever runs as high as the delirium, then the case often almost exactly resembles a case of violent synocha; from which it is the more difficult to distinguish it if the pulse be full and strong. In general, however, the hardness is more remarkable than in synocha, and in many cases the pulse is small and hard, which may be regarded as one of the best diagnostics between the two complaints, the pulse in synocha being always strong and full. In phrenitis it is sometimes, though rarely, intermitting.

The respiration is generally deep and slow, sometimes difficult, now and then interrupted with hiccup, seldom hurried and frequent, a very unfavourable symptom. In many of the cases mentioned by Saalman, pneumonia supervened.

The deglutition is often difficult, sometimes convulsive. The stomach is frequently oppressed with bile, which is an unfavourable symptom; and complete jaundice, the urine and skin being tinged yellow, sometimes supervenes. Worms in the stomach and bowels are also frequent attendants on phrenitis, and there is reason to believe, may have a share in producing it. The hydrocephalus internus, which is more allied to phrenitis than dropsy of the brain properly so called, seems often in part at least to arise from derangement of the primæ viæ, particularly from worms. We cannot otherwise, I think, account for the frequent concurrence of these complaints. As we proceed in considering the different phlegmasiæ, we shall find that there are few to which derangement of the abdominal viscera do not give some predisposition.

Instead of a superabundance of bile in the primæ viæ, there is

* Lieutaud's Synopsis Med. Pract. Sect. de Phrenitide.

† See what is said in the next section on the appearances on dissection in phrenitis.

sometimes a deficiency of it, which seems to afford even a worse prognosis. The *faeces alvinæ* being of a white colour, and a black cloud in the urine are regarded by Lohb* as fatal symptoms. The black cloud in the urine is owing to an admixture of blood; when unmixed with blood the urine is generally pale.

There is often a remarkable tendency to the worst species of hemorrhagies towards the fatal termination of phrenitis. Hemorrhagy from the eyes has already been mentioned. Hemorrhagy from the intestines also, tinging the stools with a black colour, is not uncommon. These hemorrhagies are never favourable; but the hemorrhagies characteristic of synocha, particularly that from the nose, sometimes occur at an earlier period, and, if copious, generally bring relief. More frequently, however, blood drops slowly from the nose, demonstrating the violence of the disease without relieving it. In other cases there is a discharge of thin mucus from the nose.

Tremors of the joints, convulsions of the muscles of the face grinding of the teeth, the face from being florid suddenly becoming pale, involuntary tears, a mucous discharge of the nose, the urine being of a dark red or yellow colour or black, or covered with a pellicle, the *faeces* being either bilious or white and very foetid, profuse sweat of the head, neck, and shoulders, paralysis of the tongue, general convulsions, much derangement of the internal functions, and the symptoms of other visceral inflammations, particularly of pneumonia, supervening, are enumerated by Saalman as affording the most unfavourable prognosis. The delirium changing to coma, the pulse at the same time becoming weak, and the deglutition difficult, was generally the forerunner of death.

When, on the contrary, there is a copious hemorrhagy from the hemorrhoidal vessels, from the lungs, mouth, or even from the urinary passages, when the delirium is relieved by sleep, and the patient remembers his dreams, when the sweats are free and general, the deafness is diminished or removed, and the febrile symptoms become milder, there are hopes of recovery.

In almost all diseases, if we except those which kill suddenly, as the fatal termination approaches, nearly the same train of symptoms supervenes, viz those denoting extreme debility of all the functions. These the reader will find enumerated at length in the first volume; it is unnecessary to repeat them here.

Saalman remarks that the blood did not always shew the buffy coat.

Phrenitis, like most other complaints, has sometimes assumed

* Lohb's Practice of Physic.

an intermitting form, the fits coming on daily, sometimes every second day.*

When phrenitis terminates favourably, the typhus which succeeds the increased excitement is generally less in proportion to that excitement than in idiopathic fevers, a circumstance which assists in distinguishing phrenitis from synocha.

The imperfect diagnosis between these complaints is farther assisted by the effects of the remedies employed. For if in phrenitis we succeed in removing the delirium and other local symptoms, the febrile symptoms in general soon abate. Whereas in synocha, although the delirium and head-ach be removed, yet the pulse continues frequent, and other marks of indisposition remain for a much longer time. "*Delirium vero febrile vel symptomaticum,*" says Lieutaud,† "*præviæ feбри appenditur, solosque febricitantes adoritur, cur minime mirum si, hoc sedato, perstet febris, solitamque periodum absolvat. Aliter se res habet sub phrenitide; si enim resipiscant ægri, illico sanati res-tituuntur, si excipias virium debilitatem qua aliquandiu tenentur hoc gravissimo morbo convalescentes.*"

It will be of use to present at one view the circumstances which form the diagnosis between phrenitis and synocha.

Synocha generally makes its attack in the same manner ;‡ its symptoms are few and little varied. The symptoms at the commencement of phrenitis are often more complicated, and differ considerably in different cases.

Derangement of the internal functions is comparatively rare in synocha. In phrenitis it almost constantly attends, and often appears very early. The same observation applies to the derangement of the organs of sense.

In synocha, the pulse from the commencement is frequent, strong, and rapid. In phrenitis, symptoms denoting the local affection often become considerable before the pulse is much disturbed.

In phrenitis we have seen that the pulse sometimes very suddenly loses its strength, the worst species of hemorrhagies and other symptoms denoting extreme debility shewing themselves ; such symptoms are generally the forerunners of death. But that when the termination is favourable, the degree of typhus which succeeds is less in proportion to the preceding excitement than in synocha.

Lastly, if we succeed in removing the delirium and other symptoms affecting the head, the state of the fever is found to

* See the Observations of Saalman.

† Lieutaud's Synopsis Med. Pract.

‡ See the first volume.

partake of this favourable change more immediately and completely than in synocha, where, although we succeed in relieving the head-ach or delirium, the fever often suffers little abatement.*

With regard to the duration of phrenitis, Eller† observes, that when it proves fatal the patient generally dies within six or seven days. In many fatal cases, however, it is protracted for a longer time, especially where the remissions have been considerable. Upon the whole, however, the longer it is protracted, provided the symptoms do not become worse, the better is the prognosis.

Such are the symptoms of the only form of phrenitis which, as far as I am capable of judging, deserves the name, the only true inflammation of the brain, for the comatose phrenitis in reality differs in no essential from apoplexy. And although dissectors have not been accurate in distinguishing the appearances connected with the different trains of symptoms, there is every reason to believe that the appearances after death in comatose phrenitis are the same as in apoplexy, viz. merely congestion in the larger vessels ; or this conjoined with congestion in the capillaries, that is, with traces of inflammation, in cases where the coma was preceded by delirium.

It is true indeed, that the furious and comatose phrenitis by various degrees run into each other ; for as phrenitis on the one hand imperceptibly runs into synocha, it as imperceptibly on the other runs into apoplexy.‡

From what has been said of congestion and inflammation, it is evident why coma supervening on delirium in phrenitis generally proves fatal : if while the capillaries are debilitated, the larger vessels supplying the vis a tergo which supports the circulation in them should greatly partake of the debility, the vis a tergo impelling the blood into the inflamed vessels must cease, and there will then be little hopes of restoring their action.—When, on the other hand, the congestion in the larger vessels, and consequently the coma has been present from the beginning, the capillaries have never been much distended, the vis a tergo propelling the blood into them having from the first attack of the disease been enfeebled, they therefore support the circulation, and the hope of recovery is much better.

* With every attention to the diagnosis of phrenitis, however, we may be deceived. Drs. Willis, Langrish, and Huxham relate cases in which traces of inflammation of the brain were discovered after death where the symptoms of phrenitis had not appeared ; and Bonnetus and Morgagni relate some in which all the symptoms of phrenitis were present, and yet no traces of inflammation of the brain discoverable after death.

† Eller de Cog. et Cur. Morb.

‡ I shall have occasion to treat of apoplexy when considering the nervous affections most frequently complicated with febrile diseases.

SECT. II.

Of the Appearances on Dissection.

IT appears from dissection that inflammation of the brain is subject to the same terminations with other inflammations.* When it proves fatal, some part of the substance of the brain has generally undergone suppuration. The membranes are more subject to gangrene.

Phrenitis sometimes proves fatal without having run to either of these terminations. The part affected then exhibits the same appearance as in external inflammations. The vessels conveying red blood are numerous and distended.

In those who have laboured under phrenitis, recovered and died afterwards of other complaints, the membranes of the brain have been found thickened, and in some instances converted into a substance almost as hard as bone,† and the dura matter is frequently found adhering to the skull in the places which had been occupied by the inflammation. Adhesions we shall find a very common effect of inflammation.

The pia mater however is not apt to adhere to the brain, but is, by inflammation, converted into a membrane resembling the dura matter in thickness and consistence.

In those who die of phrenitis, there is often a quantity of serum effused into the ventricles. If a tendency to gangrene has taken place, the fluid effused is a thin acrid serum. When we compare these appearances with those observed in patients who have died of hydrocephalus internus, we cannot help, I think, regarding this disease as a species of phrenitis. But this question will be examined at length when we come to consider the different species of apoplexy.

SECT. III.

Of the Causes of Phrenitis.

IN temperate climates phrenitis is a rare complaint, and when it does appear it is generally as symptomatic of fever. In the works of Sir John Pringle, and a few other European practitioners, the reader will find an account of dissections in which abscesses of the brain were found in those who died of fever. This however is comparatively a rare occurrence.

* See the *Sepulchretum Anatomicum* of Bonnetus, and the *Epistles* of Morgagni.

† Van Swieten's *Comment. in Aph. Boerhaavii*. Aph. 775.

It is in warm latitudes that idiopathic phrenitis most frequently appears. Young people, especially those of a sanguine and plethoric habit, are liable to it, and all who indulge freely in the use of fermented liquors.

The exciting cause can frequently be traced to an injury immediately applied to the brain, such as violent exercise, intoxication, rage, or any other cause tending to occasion an accumulation of blood in the head, the head being long exposed to a warm sun, long and intense study.

It often arises however from causes less immediately affecting the brain. It has been the consequence of much fatigue of body as well as of mind. Excessive venery, indigestible and poisonous substances received into the stomach, and the suppression of habitual evacuations are also to be ranked among its exciting causes.

It is evident that many or all of these may sometimes act merely as predisposing causes.

Saalman* saw phrenitis epidemic, and asserts that it was contagious. It was chiefly confined to the lowest ranks of the people, who were covered with filth; and the contagion, he observes, was rendered so virulent by a neglect of cleanliness that in a single hovel five or more were seized with it.

This epidemic attacked the old rather than the young, it was most fatal to those above 40. The hypochondriacal and melancholic were more subject to it than others. Such are the causes of phrenitis; it often however arises in the predisposed when it cannot be traced to any particular cause, especially in those who have formerly laboured under it, for, like the other phlegmasiæ, it leaves behind it a predisposition to future attacks.†

SECT. IV.

Of the Treatment of Phrenitis.

FROM what has been said of the treatment of the phlegmasiæ, and of the nature of phrenitis, the reader will infer, that the most vigorous antiphlogistic measures are necessary in this complaint, and there are few which require their more speedy employment.

Every part of the antiphlogistic regimen is necessary, but blood-letting is what we chiefly depend upon.

It fortunately happens in this complaint, that a sufficient quantity of blood can generally be procured from the neighbourhood

* Acta Erud. Lip. vol. xxxii.

† Van Swieten's Comment. in Aph. Boerhaavii:
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of the part affected, so that the same operation serves the purpose of both local and general blood-letting. When this advantage can be obtained, it is never to be overlooked. Many therefore advise blood to be taken from the temporal artery in phrenitis. Dr. Cullen thinks blood-letting from the jugular vein preferable; which is also particularly recommended by Hoffman and Eiler. The frantic state of the patient however often renders it very troublesome to let blood from this vessel.*

Dr. McBride recommends pushing the blood-letting to syncope, and if this is warrantable in any case, it is in phrenitis. But it is at all times a precarious practice, and most practitioners choose rather to repeat the blood-letting than push it so far.

With regard to the extent and repetition of the blood-letting, our practice is regulated in the same way as in synocha, except that the evacuation should be more copious in proportion to the violence of the symptoms.

It may be inferred from what has been said of catharsis in inflammatory affections of the head, that when spontaneous diarrhœa supervenes, we should be careful not to check it, and when it does not, the free use of cathartics is proper in all cases. Saalman gave calomel with other cathartics. Gentle cathartics, blood-letting, and acidulous drinks, he found the most successful remedies.

To assist in diminishing the determination of the blood to the head, the patient should be kept as near the erect posture as can easily be borne.†

A very few observations on the local remedies employed in phrenitis will be sufficient. Of these, local blood-letting is still

* Several other modes of blood-letting have been proposed in this complaint. We have been advised to open the sublingual veins; this however is attended with several inconveniences. It is difficult to open them when the patient is delirious, a small orifice is not sufficient, and a large orifice is dangerous on account of the difficulty of stopping the bleeding.

Some recommend opening the frontal vein, others scarifying the nostrils. In neither of these ways, however, can we in general procure a sufficient quantity of blood.

If phrenitis be threatened, Hoffman observes, in consequence of the suppression of the menses or lochia, venesection is to be performed from the foot, if by a suppression of the hæmorrhoids, leeches should be applied to the hæmorrhoidal vessels; concerning the efficacy of these practices, at least after the symptoms of phrenitis have actually appeared, there is much doubt. Local blood-letting appears always to be most successful when the blood is taken from the part affected, or as near it as possible. In the above cases, however, the application of leeches to the abdomen and hæmorrhoidal vessels may assist more powerful remedies, and is a probable means of preventing a relapse.

† Comparing the foregoing observations, with what was said above of Opium, it would appear that it is inadmissible in all cases of phrenitis while the inflammatory symptoms are at all considerable.

The most powerful, and in all cases, where the blood in the general blood-letting is not taken from the head or neck, should be employed at an early period.

The head should be shaved, and after the excitement has been sufficiently reduced, a blister applied over it.

A variety of rubefacients have been applied to the head in phrenitis, among which may be reckoned external warmth, which is however a very doubtful remedy. The application of cold to the head is more effectual; cloths dipped in cold water and vinegar, or even iced water, are often applied with advantage. Is the alternate use of cold and warm applications preferable? An eruption over the head has sometimes followed these applications, and very suddenly brought relief.

Warm bathing of the inferior extremities, and the application of rubefacients to them, for the purpose of revulsion, have been very generally employed. Dr. Cullen, however, regards them as very ambiguous remedies. If they be employed before the excitement has been sufficiently reduced, they may do much harm. It has been proposed to immerse the trunk and limbs in the warm bath while we make the cold application to the head.

As in all other complaints, when phrenitis can be traced to the suppression of some discharge, attempts to restore the discharge must make a principal part of the treatment.

CHAP. VII.

Of Ophthalmia.

OPHTHALMIA is defined by Dr. Cullen, "Rubor et dolor oculi, lucis intolerantia, plerumque cum lachrymatione." Except omitting *plerumque*, for a reason which will presently appear, the only alteration I would propose on this definition is similar to that proposed on the definition of phrenitis. *Phlegmasia cum rubore et dolore, &c.*

Here however the change proposed is of more importance, and confines the definition to one species of ophthalmia, the ophthalmitis.* The reader will observe, that fever makes no part of Dr. Cullen's definition of ophthalmia, and the truth is, that although Dr. Cullen arranges ophthalmia among febrile diseases, there is but one species of it, and that the least common, which is attended with fever. It is evident, however, that this is the only species which deserves the name of phlegmasia. The others belong to the order of simple inflammations. These, however, not having been considered, and being intimately connected with the phlegmasia, it will be proper to treat of the whole here.

* See the symptoms of ophthalmitis detailed, toward the end of the first section of this chapter.

Dr. Cullen divides ophthalmia into idiopathic and symptomatic. It is the former only we are to consider. The latter proceeds either from diseases of the eye, or parts in its neighbourhood, and comes under the care of the surgeon; or from diseases of the system, scrophula, lues venerea, or fever. Febrile ophthalmia I have frequently had occasion to mention; like it, the other species of symptomatic ophthalmia can only be considered with the complaints of which they form a part.

Dr. Cullen divides the idiopathic ophthalmia into two varieties, the ophthalmia membranarum and ophthalmia tarsi. The former he defines,

“ Ophthalmia in tunica adnata et ei subjacentibus membranis
“ sive tunicis oculi.”

The latter,

“ Ophthalmia cum tumore, erosione, et exudatione glutinosa
“ tarsi palpebrarum.”

Other writers have divided ophthalmia into a great number of varieties; for most of their distinctions, however, there appears to be no sufficient foundation; but Dr. Cullen, as far as I am capable of judging, has attempted to simplify too much.

Had he made fever part of his definition of ophthalmia, he would have excluded by far the majority of cases. He therefore in his Nosology wholly overlooks that species of ophthalmia which almost uniformly occasions fever, and in his First Lines he regards it as only a greater degree of the ophthalmia membranarum; and it is true, that the inflammation of the adnata often spreads to the deep-seated parts of the eye, and produces the form of the disease alluded to, but it also spreads to the tarsi, producing Dr. Cullen's second species of ophthalmia, and the inflammation of the deep-seated parts often exists with little or no inflammation of the adnata, and produces a disease certainly as different from the ophthalmia membranarum and tarsi as these are from each other.

This species of ophthalmia has been termed ophthalmitis, and is the only species which belongs to the phlegmasiæ. To it therefore I have adapted the definition by introducing the term phlegmasia and omitting plerumque, the ophthalmitis being always attended with an increased flow of tears.

Ophthalmia then is divided into three species, according as it affects the eye-lids, the membranes which cover the anterior part of the eye, viz. the adnata, or as it has been termed from its colour albuginea, and conjunctiva, or the deep-seated parts of the eye, its muscles, and the lachrymal gland.

It is very rarely however, that any of these exist in a considerable degree without producing some degree of the other. The

inflammation readily spreads along the conjunctiva, from the tarsi to the eye, or in the contrary direction. When the conjunctiva of the eye is much inflamed, the adnata soon partakes of the inflammation, and if the complaint increases, it gradually spreads to the deep seated parts.

It will be the most distinct plan to consider the symptoms of each of these species separately, beginning with the most common, the ophthalmia membranarum.

SECT. I.

Of the Symptoms of Ophthalmia.

THE tunica conjunctiva, the chief seat of the ophthalmia membranarum, lines the inner side of the eye-lids, and is reflected over the anterior part of the eye. It was formerly doubted whether it covered the cornea, by later anatomist it has been dissected from this as well as from the tunica albuginea; to the former however it adheres much more firmly. In the eye of some quadrupeds, particularly that of the ox, the conjunctiva is separated from the cornea more readily than in the human body.

The part of the conjunctiva covering the cornea is least subject to inflammation. Neither in this part nor that covering the albuginea while in a perfectly healthy state, are there any red vessels. That part of the conjunctiva which lines the eye-lids, however, is at all times supplied with red blood.

Ophthalmia sometimes comes on almost instantaneously. It is then what is termed by the vulgar a blast in the eyes. In general however its attack is more gradual.

The first symptom of the ophthalmia membranarum is an unusual redness of the conjunctiva covering the albuginea. The redness is sometimes diffused over the whole albuginea, and sometimes appears in pretty well defined blotches on different parts of it. I have observed it come on in this way in both eyes at the same time, where the injury was not applied to any part in particular.

In general the red vessels appear ramified on the albuginea, but in more severe cases it is so completely covered by a thick net-work of vessels, that it appears as if painted uniformly of a red colour, and then some red vessels can generally be traced on the cornea.

At the same time the inflammation spreads along the conjunctiva lining the eye-lids, often extending to the tarsi.

The patient complains of a sense of heat, and of a pricking or stinging pain which, when the inflammation runs high, is often

very considerable, frequently resembling the sensation produced by a sharp particle of dust blown into the eye.

In mild cases the sensation accompanying ophthalmia is rather an itching than pain, and the itching is sometimes felt not in the eye itself but in the forehead.

Although the inflammation has not spread to the lachrymal gland, ophthalmia is very frequently accompanied with an increased flow of tears. It has hence been divided into wet and dry.

The secretion is sometimes vitiated, becoming glutinous, adhering to the tarsi, and often during sleep glueing them together. This symptom however is more troublesome in the ophthalmia tarsi.

In the mildest form of ophthalmia, termed by authors taraxis, there is little or no increased flow of tears. The more severe form of the ophthalmia membranarum has been termed chemosis. "In chemosi," Trnka* observes, "non modo autem adha-ta rubet, sed sæpenumero etiam, J. L. Schmuckero teste, uvea et choroidea."

In the taraxis the swelling is generally inconsiderable and wholly confined to the eye-lids, for even in mild cases of ophthalmia, the inflammation generally spreads to the conjunctiva lining the eye-lids. In the chemosis the swelling of the eye-lids is often so great, that the tarsi are turned inwards upon the ball of the eye, and the irritation of the eye-lashes rubbing against the conjunctiva, increases the inflammation. The swelling of the eye-lids sometimes produces an opposite effect, they are almost inverted, the tarsi being turned outwards and the eye remaining open.†

But in the more severe cases of the ophthalmia membranarum the swelling is not confined to the eye-lids; the coats of the eye partake of it. "Conjunctivam," Schmuckerus observes, "ab accumulato sanguine usque adco tumuisse observatum est, ut tres quatuor pluresve lineas crassa fuerit."‡ So great a degree of swelling in the conjunctiva is uncommon, but the coats which lie under it partaking of the swelling, it often appears upon the whole very considerable.

As the swelling, like other symptoms of inflammation, is generally less considerable in the cornea than the other parts of the eye, it often appears sunk in a hollow formed by the tumified

* Trnka's *Historia Ophthalmiæ*. The reader will find a good account of chemosis in the 127th and following pages of Vogel's *Prælectiones Academicæ*.

† Vogel *Præl. Acad. de Cog. et Cur. Morb.*

‡ Trnka, *Historia Ophthalmiæ*.

coats. "Son épaisseur," St. Yves* observes, égale celle d'un "travers de doigt, ce qui fait paroître la cornée transparente comme dans un enfoncement.

The swelling of the eye and eye-lids often becomes so considerable that the patient is unable to open the eyes. In this state the complaint has been called phymosis, the name of a similar affection of the penis. The degree of swelling in the worst cases of the ophthalmia membranarum is sometimes astonishing; we find one author relating a case in which the tumor equalled a man's hand, and another declaring that he has seen the eye so far protruded from the socket, that it rested on the upper lip.

In such cases the inflammation not only spreads to every part of the eye and eye-lids, but to the whole side of the face; the patient complains of violent pains in the forehead and temples, and the cheek becomes swelled and inflamed.

Although the complaint had at first been confined to one eye when it arises to this degree, the other always partakes of it.

The intolerance of light is generally proportioned to the degree of inflammation. In the less violent cases of ophthalmia membranarum it seems to proceed from the sympathy which subsists between the retina and every part of the eye. When the inflammation runs very high, however, every part of the eye more or less partakes of it.

Spasms of neighbouring parts, particularly of the eye-lids, often attend ophthalmia. In the more severe cases the whole muscles of the face become affected with them.

It was observed above, that external inflammations are less apt than internal to produce fever, and that inflammations of the head are apt to produce fever in proportion to their vicinity to the brain. In all cases in which fever is symptomatic of ophthalmia, we have reason to believe that the inflammation has spread to the deeper seated parts. The simple ophthalmia membranarum and tarsi never seem to occasion fever.

Such are the symptoms which attend the commencement and progress of ophthalmia membranarum; its consequences are very various.

Like other inflammations it is subject to resolution, suppuration, and gangrene.

If the inflammation be confined to the eye, resolution is the only termination which can be regarded as favourable; for according to the definition of suppuration I have adopted, a discharge

* *Traité des Maladies des Yeux*, by St. Yves. See also Vogel's *Præf. Acad.*

of pus without ulceration, which frequently takes place from the eye and has given rise to the name purulent ophthalmia, does not deserve the name of suppuration. When the eye-lid partakes much of the inflammation, suppuration is often a favourable termination. If, however, the abscess is discharged on the inner side of the eye-lids, it frequently proves troublesome.

The effects of suppuration of the eye itself are various. "During the continuance of the inflammation," Mr. Ware* observes, "small ulcers are often formed on the cornea; which being first caused by it, serve afterwards to increase it, and render the cure more difficult. These ulcers generally heal in a depression, which is a great impediment to the sight, causing objects to appear as if they were seen through crinkled glass.

"Small abscesses are also sometimes formed between the lamina of the cornea, which, instead of discharging their contents, harden into white opaque specks, and according to their size either partially or totally prevent the entrance of the light.

"When the thickening of the cornea," Mr. Noble† observes, "is towards the centre, and so great as to prevent the passage of the rays of light to the retina, the eye will frequently accommodate itself to its imperfections by turning on one side, that the transparent part of the cornea may be opposed to the object." The reader will find a striking instance of this related by Mr. Noble.

"If the specks are superficial," Mr. Ware proceeds, "they may wear off in a course of time, but if they penetrate through the whole thickness of the cornea, they do not seem to admit of any remedy.

"These abscesses sometimes burst on the inside of the cornea, and discharge the matter they contain into the anterior chamber of the aqueous humour, to the bottom of which it descends by its own weight, and there it makes an appearance like the white speck at the root of the nails, on which account it has been called *onyx*. The matter thus produced is usually small in quantity; the solid texture of the cornea, naturally disposing it for a large suppuration.

"Nevertheless it not unfrequently happens, when there is a long continuance of a violent ophthalmia, that the quantity of matter formed in the anterior chamber, becomes much more considerable without any perceptible disorder in the above mentioned coat of the eye, and in this larger collected state it takes the name of *hypopion*. It is difficult to ascertain as well the source from which this matter proceeds, as the manner in which it is formed." This seems to be only one of the many

* Mr. Ware's Treatise on Ophthalmia, &c.

† A Treatise on Ophthalmia by Mr. Noble.

instances in which pus is formed by inflamed surfaces independently of ulceration. The pus is sometimes absorbed, a colourless aqueous fluid being secreted, by which the sight is restored. Matter sometimes collects also in the posterior chamber of the aqueous humour. It may here either remain in a fluid state, or be inspissated into a solid substance. If it continues fluid, a part of it usually passes through the pupil into the anterior chamber, and falls to the lower margin of the cornea.

When it becomes inspissated, it most commonly forms adhesions, either to the capsule of the crystalline humour or to the posterior surface of the iris, or to both; and in consequence of these adhesions the pupil becomes contracted, and its figure is rendered more or less irregular according to the extent of the adhesion. Sometimes the inspissated matter continues loose, and varies its position in the aqueous humour. In this case, if it is small in quantity, it changes its place, according to the direction in which the head is held, and therefore sometimes passes through the pupil into the anterior chamber. Sometimes again the inspissated matter remains fixed in the posterior chamber, and there takes the shape of a membrane, dividing this chamber into two distinct cavities, and answering precisely to the idea entertained by the ancients of the cataract. This membrane often adheres by its circular edge only; the middle part continuing loose and moveable. In such a case, as the adhesion is only partial, the pupil still keeps its figure, and the iris also preserves its capacity for motion, though not to the same extent as when there is no adhesion. When the pupil contracts, the adventitious membrane has in some instances been observed to protrude through it, but to return to its former and common situation when the pupil is dilated.

"If the increased action and sensation," Mr. Noble observes, "are not very violent, the vessels in many parts of the cornea secrete a small quantity of pus, which is deposited at their extremities, and is not sufficient to produce a speck, but gives the eye a dull whitish muddy appearance, which has been called nebula or a cloud. The pupil is scarcely visible through it, and objects are not distinguished by the patient. The organization of the cornea is not much injured by it, as on the inflammation subsiding the opacity is soon absorbed, and the sight returns."

It is very doubtful whether this appearance is owing to a secretion of pus. Other parts of the eye, we have reason to believe, besides the crystalline lens, are subject to opacity independently of suppuration. The appearance of the cloud which frequently succeeds even slight cases of ophthalmia, is much against the supposition of its arising from any secretion of pus, which, except when secreted on a surface, is always collected in a cavity formed for its reception; and with respect to the opacity of the aqueous

humour, although all writers admit that its opacity, which sometimes remains after severe ophthalmia, is frequently owing to a secretion of pus yet it has with much probability been maintained, that inflammation sometimes occasions an opacity of this humour independently of any admixture of pus. Nay, the true cataract the opacity of the chrystalline lens, has sometimes, though rarely, been the consequence of ophthalmia. "Produce solet cataracta," says Lieutaud,* "a defluxionibus chronicis gravioribus, *ophthalmiis* epiphora contumaciori, cephalalgia perenni, contusionibus," &c.

"If the abscess," Mr. Noble observes, "should be very large and deep seated in the substance of the cornea, and burst internally, such a considerable support is frequently taken away from that part of the cornea, that the remaining portion is no longer able to support the action of the muscles, but gives way, and as when all the muscles act at the same time they press the sides of the eye nearer together and inwards, a part of the iris is protruded through the wound in the cornea, forming a small black spot, which has been compared to the head of a common fly, and is spoken of by authors under the name of myocephalus.

"If the protrusion is small, though the form of the pupil is changed to an oblong, yet still the iris retains its motion, and the sight is little injured : but if large it loses its power of contraction and dilatation, and in some cases the edges, from being inflamed and remaining sometime in contact, adhere and the pupil is obliterated."

Another consequence sometimes follows suppuration of the cornea ; when it is rendered so thin as to be no longer capable of confining the humours, part of these are sometimes protruded in the form of a hernia, and become incrassated.† This affection was termed by the ancients staphyloma.

Such are the principal consequences to be dreaded from suppuration in the ophthalmia membranarum.

Mortification is a rare occurrence in any form of ophthalmia, and never perhaps supervenes in the ophthalmia membranarum.

But besides the terminations common to all kinds of inflammation, this form of ophthalmia is sometimes followed by consequences wholly resulting from the nature of the parts it occupies. I have already had occasion to mention the opacity of the cornea, aqueous humour, and chrystalline lens, independently of any formation of pus, as consequences of ophthalmia.

One of its most remarkable consequences is such a contraction of the iris, that there hardly remains a vestige of the pupil. The

* Synopsis Medicinæ Praxeos.

† See the 5th case of ophthalmia related by Hoffman.

sight has sometimes been restored in this case by making an artificial pupil. "Verum cum puris pars," Trnka* observes, "in anticis oculi cameris adhæsisset, irritata inde iris adeo sese contraxit ut ne vestigium quidem reliquerit pupillæ. Cum autem oculus nativam suam globositatem conservasset, ægerque illius ope et lucem a tenebris et umbras corporum ante illum motorum distingueret, pupilla artificialis in eodem facta est. Sicque æger bimestri post operationem hoc oculo omnia objecta rite distinguebat"† A fissure of the iris also, termed staphyloma iridis, has been the consequence of violent ophthalmia membranarum.

It is not uncommon for new vessels and other parts to be formed, which impede or entirely obstruct the functions of the organ. Hence, at times," Mr. Noble observes, "we find an increase of cellular substance to the conjunctiva with a congeries of new vessels, which generally produce a prominent ridge running from one of the angles towards the centre of the cornea. At other times, when the inflammation has been violent and of some continuance, small vessels are to be seen on the external surface of the cornea. In general there are not many, and their course is from the edge of the cornea towards its centre in right lines. Though commonly there are not more than from six to eight or ten of these vessels, in some the whole cornea is surrounded with them, which have the appearance of radii converging to a centre; and in some few cases, when the inflammation has been rather severe, has several times a little subsided, and has again returned in quick succession, this diseased action has gone so far as to permeate the whole body of the cornea, giving it the appearance of a highly vascular substance."

***** This peculiar action of the vessels is not confined to the external surface of the eye alone. At times it affects the iris, and small spots or filaments are projected from its circular edge, which have somewhat the appearance of the iris in a horse. If they continue to be secreted, they extend themselves either till they unite with the projecting membrane on the other side, and thus form an opaque substance, which occupies the circular aperture of the iris, and prevents vision; or else they unite to the capsule of the chrystalline lens, by which the motion of the iris is impeded, and the sight rendered very imperfect. It must be observed, however, that in this latter case the vessels of the capsule of the chrystalline humour are previously affected with this kind of diseased action, which generally begins towards the centre; and if, after the projecting fibres from the iris have continued for some time, the eye is carefully examined, it will generally be found, there is a small opaque spot on the centre of the capsule. In a few weeks, and sometimes even

* Historia Ophthalmiæ.

† The reader will find a remarkable case of this kind from Citiz. Demours's Observations on the artificial Pupil, in the 25th number of the London Medical Review and Magazine.

“ in a few days, it will be seen that the iris has almost lost all motion, and that near its edge on the capsule, there is a small circular clear ring, through which what little sight the patient has must be obtained, as the middle is occupied by the white opaque spot.” * * * * “ Occasionally the action of the vessels in the internal part of the eye is so far diseased, as to change the structure of the vitreous humour or to induce a paralysis of the retina.”

The latter consequences are only to be dreaded when the ophthalmia membranarum is complicated with the ophthalmitis, the symptoms of which we are presently to consider.

Besides the foregoing consequences, ophthalmia may produce diseases of the puncta lacrymalia, of the lacrymal sack, and passage from this to the nose. But it would be improper here to enter more particularly into the various consequences of ophthalmia, all of which come under the province of the surgeon.

Such are the symptoms and principal consequences of the ophthalmia membranarum, the most common form of the disease; on those of the ophthalmia tarsi a very few observations will be sufficient.

In its attack this form of the disease often resembles the foregoing, the inflammation first appearing in the conjunctiva, or to speak more accurately, the ophthalmia tarsi often follows a slight attack of the ophthalmia membranarum. The inflammation however soon spreads to the tarsi, where it frequently indeed makes its first appearance, but it seldom becomes considerable there, without affecting the conjunctiva of the eye.

The tarsi are red and swelled, and pour out a glutinous matter which glues the eye-lids together during sleep, and both in this way, and by forming small hard masses adhering to the eye-lashes, increases the complaint.

The patient complains of a constant uneasiness of the eyes, but never of the severe pain which sometimes attends the ophthalmia membranarum. The uneasiness is increased by the falling off of the eye-lashes which defend the eye from strong light, dust, &c.

Both the ophthalmia membranarum and tarsi are apt to become chronic complaints, but the latter much more frequently than the former. It is not uncommon, particularly in scrophulous habits, for the ophthalmia tarsi to last for the greater part of life, but it is less apt to be followed by injury of the sight than the ophthalmia membranarum. It is seldom however that there is any considerable degree of the one without more or less of the other, and in different cases they are combined in every possible degree. The ophthalmia tarsi more frequently runs to suppuration than the other varieties of the complaint, small suppura-

tions often forming at the same time in various parts of the tarsi, and frequently without considerably relieving the inflammation. Except when combined with ophthalmitis it never runs to gangrene, nor does it ever terminate in schirrus.

It often happens when the ophthalmia tarsi is attended with much swelling, as where it is accompanied with a considerable degree of the ophthalmia membranarum, that the eye-lids grow together. This is the consequence of small suppurations forming on the tarsi, or of the cuticle being abraded by the acrimony of the discharge. Any parts of the body deprived of the cuticle and kept closely applied will adhere. The surgeon readily removes blindness from this cause by separating the tarsi by the knife, and preventing them from again growing together by the interposition of proper dressings till the wounds are healed.

The symptoms of the most alarming form of ophthalmia still remain to be considered, in which the inflammation attacks the deep-seated parts of the eye, and gives rise to one of the most tormenting complaints we are subject to. This form of the disease is termed by some ophthalmitis, by others phlegmon oculi, some term it chemosis, the appellation generally used for the severer cases of the ophthalmia membranarum.

The ophthalmitis sometimes comes on without being preceded by either of the other species of ophthalmia, and it now and then happens that the anterior parts of the eye remain free from inflammation. In many cases however the anterior parts are first affected, and the inflammation spreads gradually to the deep-seated. As soon as the inflammation spreads to the latter, the pain becomes more severe, extending to the temple and over a great part of the head, often particularly felt, St. Yves remarks, on the crown of the head, and increased by the slightest pressure of the eye.

As the deep-seated parts become affected, the inflammation of the conjunctiva and aduata sometimes abates.

When the inflammation seizes the lacrymal gland, there is a severe pain referred to its seat, the flow of tears is very great, and some protuberance of the upper eye-lid may often be observed.*

As soon as the retina becomes affected, the sight grows confused, the patient sees every thing covered with black spots, incessant clouds pass before the eyes, or fire seems to dart across them. Deceptions of vision sometimes attend the ophthalmia membranarum when the inflammation has spread to the cornea.† As the inflammation of the retina increases, the intolerance of

* Lieutaud's Synopsis Prax Medicinæ.

† See Dr. Home's Obs. on Chemosis. Princip. Medic.

light becomes extreme, and the patient is at length seized with a degree of phrenzy, if the eyes be exposed to it.

This form of the disease never lasts long without being attended with fever ; and when the pain of the eye is very great, it is not uncommon for delirium to supervene.

With one or both eyes thus affected, the patient passes sleepless nights, always in severe pain ; in many cases, with intervals of excruciating torture.

If the thickened conjunctiva, says Lieutaud, protrude beyond the cornea, (the different species of ophthalmia, we have seen, are often combined) if the lacrymal gland be inflamed, if the pains at the bottom of the orbit be excessive, spreading over the head, if the fever be great, and the watching constant, total blindness is to be feared. We have sufficient proof in Trnka's *Historia Ophthalmiæ*, of amaurosis sometimes being the consequence of severe ophthalmia ; this however is not a common effect of the disease.

It is unnecessary to observe, that resolution is the only favourable termination of ophthalmitis. Suppuration is often attended with a general efflux of all the humours ; and gangrene, while it proves as destructive to the eye, endangers life.

We judge of the tendency to these different terminations in the same way as in the other phlegmasiæ. When the symptoms are moderate, and yield to the usual remedies, we have reason to hope for resolution ; when they are unusually obstinate, suppuration is to be dreaded ; when unusually violent and yielding in little or no degree to the proper remedies, gangrene.

With respect to schirrus, regarded by many as a consequence of ophthalmia ; when it follows this complaint, it seems to proceed less from the violence of the inflammation than some peculiarity of disposition. The observations on schirrus and cancer, quoted from Dr. Cullen when speaking of inflammation in general, are applicable here.

When ophthalmia is attended with fever, like other febrile diseases, it is occasionally terminated by critical evacuations, by spontaneous hemorrhagy, sweat, or diarrhœa.

SECT. II.

Of the Causes of Ophthalmia.

THE different species of ophthalmia may appear at any age and in any habit. Certain species however are most apt to attack certain constitutions, and to appear at certain periods of life. In the young, robust, and sanguine, the ophthalmia membranarum and ophthalmitis are most common. The ophthalmia tar-

si is more apt to attack those of a delicate habit or of an advanced age.

The scrophulous ophthalmia at least, is often hereditary.

As happens with respect to all other inflammations, those who have already laboured under ophthalmia are most liable to it.

It is more frequent in spring and autumn, than in seasons when the weather is less variable. Among the predisposing causes may be ranked the complaints in which ophthalmia most frequently supervenes. It more frequently accompanies synocha than typhus, and some of the exanthemata more frequently than either; particularly, measles, small-pox, and scarlatina. It is a frequent concomitant of all inflammatory affections of the head.

Such appear to be the chief predisposing causes of this complaint.* Some even of these act occasionally as exciting causes, and in the numerous list of exciting causes the reader will readily perceive that there are many which must act occasionally as predisposing.

Dr. Cullen arranges the exciting causes of ophthalmia under ten heads, and numerous as his catalogue is, he seems to have omitted many. The situation, use, and extreme delicacy of the eye render it so subject to injury, that there is no disease perhaps which may be occasioned in a greater variety of ways, than inflammation of this organ.

Dr. Cullen's first division of the exciting causes of ophthalmia are, "External violence, by blows, contusions, and wounds applied to the eyes, and even very slight impulses applied, whilst the eye-lids are open, to the ball of the eye itself."

These causes may excite inflammation of the eye in the same way in which mechanical injury excites inflammation in any part of the body; but they may also act only indirectly as exciting causes of ophthalmia, by occasioning some derangement in the structure of the eye, which often proves a more obstinate cause of inflammation. In consequence of a blow on the eye, the crystalline lens has burst its capsule, and been forced through the iris into the anterior chamber of the eye, where it has lain for some years, or even the greater part of life, occasionally exciting inflammation.*

A blow on the eye frequently occasions an extravasation of blood under the conjunctiva, which is absorbed very slowly; the quantity is sometimes so great as to distend the conjunctiva, giving it the appearance it assumes in chemosis; at other times, when the quantity is small, it forms only a red spot or blotch.

* The reader will find two cases of this kind related by Mr. Noble, in his *Treatise on Ophthalmy*.

Before the extravasated blood is absorbed, it becomes dark and livid. It never however excites much inflammation, nor leaves any permanent affection of the sight; where these happen the cause which produced the extravasation has at the same time otherwise injured the eye.*

That wounds with sharp instruments may in various ways so derange the structure of the eye as to leave it subject to ophthalmia, may be readily conceived.

"If, by the wound, the iris is divided, or the cornea penetrated very near where it is joined to the tunica sclerotica, part of the iris is frequently protruded through the aperture and forms one species of the staphyloma. In that case the figure of the pupil is changed from a circular to an oval, or some other irregular form; but if the protrusion is small, the part of the iris which is not displaced preserves its power of contracting and dilating, and the sight, after the subsiding of the inflammation, is as perfect as before.

"If the protrusion has been greater, it forms a large irregular projecting substance, which by rubbing against the lids adds much to the irritation, and in consequence the inflammation is much increased, which frequently produces adhesions of the iris, with loss of motion, and a thickening of the cornea or of the chrystalline lens, that is succeeded by an incurable blindness.†

Dr. Cullen's second set of the causes of ophthalmia are "Extraneous bodies introduced under the eye-lids, either of an acrid quality, as smoke and other acrid vapours, or of a bulk sufficient to impede the free motion of the eye-lids upon the surface of the eye-balls."

To this head belongs ophthalmia from the eye-lashes growing in upon the eye, which happens either from the tarsi being turned inwards, or from the growth of preternatural hairs. When the complaint proceeds from an inversion of the tarsi, it has been termed trichiasis.

"3." Dr. Cullen continues, "The application of a strong light, or even of a moderate light long continued.

"4. The application of much heat, particularly that with moisture." To this division may be referred the ophthalmia caused by weeping, or by the tears being confined by the swelling of the eye-lids, as frequently happens in measles, or accumulated and falling over the cheeks where the passage from the lacrymal

* Mr. Ware's Treatise on Ophthalmia, &c.

† Mr. Noble's Treatise on Ophthalmia. See also Mr. Ware's Treatise on the same complaint.

sack is obstructed, forming the disease termed by surgeons fistula lacrymalis.

Dr. Cullen's fifth division of the causes of ophthalmia is, "Much exercise of the eyes in viewing minute objects."

"6. Frequent intoxication."

Dr. Cullen's seventh, eighth, and tenth divisions of the causes of ophthalmia belong to symptomatic ophthalmia, namely,

"7. Irritation from other and various diseases of the eyes.

"8. An acrimony prevailing in the mass of blood, and deposited on the sebaceous glands on the edges of the eye-lids."

"10. A certain consent of the eyes with the other parts of the system, whereby from a certain state of these parts, either a simultaneous, or an alternating affection of the eyes is produced."

In the eighth division Dr. Cullen alludes to the ophthalmia, which sometimes accompanies scrophula, lues venerea, and some other diseases. It would be tedious and foreign to my design to enter here into the dispute whether there really be such a complaint as the venereal ophthalmia,* or whether ophthalmia ever arises from the absorption of pus.

The causes included in Dr. Cullen's ninth division may produce either symptomatic or idiopathic ophthalmia. "A change in the distribution of the blood, whereby either a more than usual quantity of blood, and with more than usual force, is impelled into the vessels of the head, or whereby the free return of the venous blood from the vessels of the head is interrupted." Hence the ophthalmia symptomatic of synocha, of apoplexy, &c. and hence also ophthalmia from violent exercise or any other cause which occasions an unusual determination of blood to the head.

There are some causes of idiopathic ophthalmia, however, not referrible to any of the foregoing heads.

Ophthalmia, like most other inflammations, often arises from cold, especially if alternated with a high temperature, and combined with moisture. The application of cold to the eye itself often produces ophthalmia in the predisposed. It more frequently has this effect however when applied to the body in general, and particularly to the extremities. Hence the frequency of ophthalmia in cold, moist, and variable weather.

Certain ingesta will sometimes produce it in the predisposed. Instances are related by Trnka and others in which a small quantity of certain fermented liquors produced ophthalmia, while the

* See the Treatises of St. Yves, Mr. Ware, and others.

patient could take many times the quantity of alkohol in any other form without experiencing the same effect. Whatever indeed produces much irritation of the primæ viæ may, especially in the predisposed, excite ophthalmia.

The ophthalmia which sometimes accompanies considerable derangement of the stomach and bowels, for example from worms lodged in these cavities,* may be regarded rather as symptomatic than idiopathic.

Cases are mentioned by Dr. Whytt of Edinburgh and others, of people of a delicate habit, subject to nausea and other disorders of the stomach, who never had an attack of such complaints without at the same time suffering from ophthalmia, a remarkable instance of which I have frequently witnessed. The reader will find cases (one is related by Trnka) in which ophthalmia was induced by hypercatharsis. An opposite state of the bowels, costiveness, is a more frequent cause of the complaint. There is reason to believe that these causes act chiefly in consequence of the irritation they occasion. They may partly however be referrible to Dr. Cullen's ninth division. Are the following causes referrible to the same division? A check given to insensible, or what is still more apt to produce ophthalmia, to sensible perspiration: The retrocession of inflammation of the surface or of eruptions of various kinds: The ceasing of habitual hemorrhagies or other discharges, and the subsiding of tumors.

Changes in the state of the excretions however, independently of any change in the distribution of the fluids, seems capable of producing ophthalmia. Trnka says, that he has observed a patient seized with ophthalmia, on the urine, from being very fetid becoming natural.

Although on the ceasing of habitual discharges, the change produced in the distribution of the fluids may have a considerable share in occasioning this and similar complaints, it would appear, I think, from many observations, that much of the effect is to be ascribed to irritation occasioned by the retention of what ought to be expelled.

It is a common opinion that ophthalmia is contagious, at least that the disease may be taken by looking at those affected with it. This opinion, which is as old as Ovid, "*Dum spectant læsos, oculi læduntur et ipsi*" may have originated in various ways. Particularly in moist variable weather, ophthalmia is sometimes so general as to be almost regarded as an epidemic.† Some spe-

* Trnka, *Historia Ophthalmiæ*.

† "It often," Mr. Ware observes, "affects a whole neighbourhood at the same time; as was the case during the summer 1778, at Newbury in Berkshire, and in several of the camps; where it was known by the name of the ocular disease."

ies of it are more or less hereditary, so that it is not uncommon for many children of the same family to labour under it. —

Improbable as the opinion appears, that a complaint of this nature should be contagious, it has even been maintained by physicians, and some instances have been adduced to establish the truth of it, in one of which three servants, it is said, received the disease from their mistress, and in many it was received by sleeping with those affected by it. The only fact with which I am acquainted tending to support the opinion is, that many experience an increased secretion of tears when they look at those labouring under ophthalmia. Whether or not this sympathy may go so far as to produce the disease in the predisposed, it is difficult to say.

Another popular opinion is, that the tears of those labouring under ophthalmia, if applied to the eyes of others, will produce the disease. Although this opinion is even more generally received than the last, it seems to rest on no better foundation.

One circumstance which greatly varies the exciting causes of most complaints, should always be kept in view. If habit or any other cause has once produced a strong tendency to a disease, almost every thing which deranges the system, and still more whatever affects the seat of the complaint, acts occasionally as an exciting cause, although the same causes may be applied a thousand times to the unpredisposed, without producing a single symptom of the complaint. This observation is particularly applicable to some of the foregoing causes of ophthalmia.

SECT. III.

Of the Treatment of Ophthalmia.

THE indications in the treatment of ophthalmia when attended with fever, are the same as in the other phlegmasiæ.

1. To remove the remote causes if they still continue to operate.
2. To diminish the vis a tergo.
3. To excite the debilitated vessels of the part.

In many cases the application of the remote causes is only momentary, as in ophthalmia from blows and wounds; or they are such as we have no means of removing, as in ophthalmia from a portion of the iris having been protruded through a wound of the cornea.

When ophthalmia arises from hard particles introduced under the eye-lids or adhering to the eye, these must in the first place be removed. This the patient often instinctively does by rubbing

the eyes, which both increases the flow of tears occasioned by the extraneous body, and by moving it from place to place promotes its expulsion. If this fails, by holding the eye-lids open and desiring the patient to look to the side opposite to the seat of the offending cause, it may often be perceived, and is then in general readily removed. Immersing the eye in an eye cup filled with water, and then opening it, is often successful ; or if many particles have entered the eye, it may be gently syringed with warm water. When particles are insinuated under the upper eye-lid, it is sometimes necessary to invert the lid.*

When they adhere to the cornea or other parts of the eye with such force as resists gentler means, they must be removed with the point of the lancet, or, as Mr. Ware advises, with a blunt pointed scoop.

One of the most troublesome causes of ophthalmia is an inversion of the eye-lids, so that the eye-lashes press on the ball of the eye. The following observations of Mr. Ware seem to include nearly all that need be said on this part of the subject. " For an ophthalmia thus produced, a palliative cure may be effected, or, to speak more conformably to the fact, a present and temporary relief may be given to the patient, by taking out the lashes with a forceps.* * * But while the lids retain this inverted state, no sooner do the hairs grow again, than the disorder will again return ; nor can the patient be ever properly said to be cured of the complaint till the edges of the lids are restored to their natural position, and can be kept in it.

" It is however necessary that a distinction be made between an inversion of the upper and lower lid. For an inversion of either will produce the same effect, yet in the different lids, it appears to arise from different causes, and consequently to require different methods of cure."

" The upper lid and its ciliary edge, both in motion and at rest, are preserved in their natural situation, by the equal, though contrary, actions of the musculus orbicularis and levator palpebræ superioris ; but the lower lid, whose motion is very small in comparison with that of the former, has no muscle correspondent to the levator of the upper, and is preserved in its natural state by the equal action of the orbicular fibres spread over it, and the counteraction of the skin which covers it ; in which last respect it differs materially from the upper lid, the skin of which on the contrary being always very thin and flaccid, is incapable of any such counteracting power.

" From the above account, it is manifest, that when the trichiasis affects the upper lid, it must be owing to a relaxation of the levator palpebræ superioris, and a contraction of the supe-

* Mr. Ware's Treatise on Ophthalmia.

“rior part of the orbicularis ; whereas in the case of a trichiasis affecting the lower lid, it can only arise from a relaxation of the skin and a contraction of the inferior part of the orbicularis. And as in these two cases the causes of the disorder are very different, so they will of consequence require a very different treatment.”

“In the trichiasis of the lower lid, it will be necessary to increase the contracting power of the skin which covers that lid, so as to prevent the contraction of the musculus orbicularis. Whereas in the trichiasis of the upper lid, it is plain that the sole object of attention must be to give an additional stimulus to the levator palpebræ superioris, for the purpose of exciting it to proper action. The trichiasis of the upper lid happens but seldom. But in an instance of this kind which did occur, an entire cure was produced by an operation.”

Cauterizing the levator palpebræ superioris, by which such a contraction was produced in it as often takes place in muscles after burns.*

“The trichiasis of the lower lid is a more common complaint. When it is recent, a cure has sometimes been accomplished, by making a fold in the skin below the inverted lid to draw its edge from the eye. In some cases nothing more will be requisite to preserve the fold, than to cover it with a piece of sticking plaster. But at other times, when the plaster cannot be made to fasten, it will be necessary to use an instrument for the purpose, which must be so contrived as to take up a small portion of the skin and to hang by it on the cheek.

“When the disorder is slight, the skin may be restored to its natural state by the methods above described. But in more obstinate cases I have generally been obliged for the same end to cut off a small transverse portion of the loose skin below the edge of the lid, and afterwards confine the sides of the wounds together by means of two or three sutures, which has effectually answered the purpose.

“There are cases however in which none of these methods will be sufficient for the cure, as where the ciliary edges are not only inverted, but likewise contracted in length.

“Under these circumstances, relief is to be obtained in no other way, but by enlarging the circumference of the ciliary edges. This may be done either by an incision at the outer angle, or by a complete division of the cartilage called tarsus, in the middle. The first of these operations is no more than a simple straight incision, which may be made with a sharp point-

* The reader will find an account of this case and of the manner of performing the operation, in the 94th and following pages of Mr. Ware's Treatise.

“ed curved bistoury. The last, which is seldom necessary, will also be best performed by the same instrument, only observing that the point be carefully introduced between the globe and eye-lid, and carried below the cartilage, that is, about one eighth of an inch in the whole ; whence it is to be pushed outward in a horizontal direction, till it has cut its way through the lid ; the cartilage being thus entirely divided, each portion will recede towards the angles and a separation be left between them, which will not only take off the complaint for the present, but prevent the possibility of its return for the future.

“I have only farther to add on the extraordinary instance of an ophthalmia produced by a preternatural row of eye-lashes growing out of the inner termination of the edge of the lid ; that, as far as hitherto appears, nothing better can be done for it than the application of the palliative remedy above mentioned ; I mean the frequent extraction of the hairs by the roots : for though other attempts have sometimes been made, they have proved so very unsuccessful as not to deserve farther notice.”

There is only, as far as I know, one case of ophthalmia from the eye-lashes omitted in the foregoing quotation. It sometimes happens, where there neither are hairs which deserve the name of preternatural, nor any inversion of the eye-lids, that a few delicate hairs, particularly towards the inner canthus, in those of a fair complexion often hardly visible, will turn in upon the eye, and support a very gentle and moderate ophthalmia, an obstinate case of which I have seen, where, from the extreme minuteness of the hairs, the cause was not for a long time suspected, in which however every remedy failed till it was removed.

If ophthalmia proceed from the presence of irritating matter in the stomach and intestines, this must be removed by emetics and cathartics ; if from hypercatharsis, by astringents and anodynes, which both tend to check the hypercatharsis, and allay the irritation which attends it. If from the suppression of the excretion by the skin or any other, we must endeavour to restore it.

We are also to restore the discharge if it arises from the drying up of sores or issues, or the suppression of hemorrhoids ; if from the retrocession of eruption, the means of recalling these pointed out in speaking of eruptive fevers must be employed.

Among the causes of ophthalmia most frequently applied after the commencement of the complaint, is the application of light and heat.

The evident advantage derived from excluding the light has given rise to various contrivances, which by increasing the temperature of the part, often do more harm than good. The light should be excluded without preventing the access of cool air. In severe ophthalmia, the patient should always be confined to

a dark well ventilated chamber. The total exclusion of light is not necessary where the inflammation is slight. But exercise of the eye must be avoided in all cases.

The morbid secretion from the inflamed eyes, by the irritation it occasions, is often a means of increasing the complaint. The eye ought therefore to be frequently washed. The proper composition of the lotion we shall presently have occasion to consider.

The irritation arising from the morbid secretion is farther increased by its gluing together the eye-lids during sleep. This is prevented by interposing between the eye-lids some mild ointment. By the same means the discharge may be prevented from forming into small hard masses on the tarsi.

As every thing which occasions a determination of blood to the head may produce ophthalmia, much exercise is to be avoided, and every other cause which increases the rapidity of the circulation, and the head should be raised when the patient is in bed.

Having as far as we are able, removed the causes of the ophthalmia, we must endeavour to excite the debilitated vessels of the eye, the first step towards which is diminishing the *vis a tergo*.

The means which diminish the general excitement are of comparatively little service where the complaint is merely local. Their employment therefore is chiefly confined to the ophthalmitis, that species of ophthalmia occasioning fever; and respecting their employment there is nothing to be said in addition to what was delivered when speaking of the treatment of the phlegmasiæ in general.

As in phrenitis, blood-letting from the jugular vein is more effectual than from the arm. In the worst cases of ophthalmitis we have seen the inflammation spread to the brain; the complaint is then to be treated in precisely the same way with phrenitis, with the addition of the local remedies about to be pointed out.

With respect to catharsis, I have already had occasion to mention the necessity of having immediate recourse to it when there is reason to suppose that the disease has in any degree arisen from the presence of irritating matter in the *primæ viæ*. But independently of this, it produces the same good effects in ophthalmia as in other inflammations of the head, and that whether the complaint be accompanied with fever or not.

With regard to the other evacuations affecting the whole system, diaphoresis is always beneficial, when it is general and excited without much increase of temperature and heating medicines: it is particularly indicated where the complaint has arisen

from cold or other causes suppressing the perspiration. Except ophthalmia arises from the morbid contents of the stomach, vomiting is pernicious, and the more so the more severe the ophthalmia.

While we are endeavouring to diminish the *vis a tergo* by evacuations, we must be careful not to increase it by improper diet. The food should be of the mildest kind, and in order to defend the stomach and bowels against the irritation of their contents, it should be mucilaginous. In the most severe cases of ophthalmitis it should consist chiefly of some mild farinaceous decoction, which, while it allays thirst and supplies sufficient nourishment, tends both to moderate excitement and promote the perspiration. Such are the means which diminish the *vis a tergo* by diminishing the general excitement. It is to be recollected however, in this as well as in all other inflammations, that, as the *vis a tergo* supplying the capillaries is supported by the vessels immediately preceding them in the course of the circulation, all local evacuations, while they relieve the congestion in the inflamed vessels, tend at the same time to diminish the force which distends them.

We may sometimes produce a local evacuation sufficient to relieve ophthalmia, by increasing some of the neighbouring secretions; the secretion of the tears, of the mucus of the nose, of the saliva, or that by the skin of the head.

Increasing the two first is a doubtful practice, and an increased flow of saliva seldom affords much relief.

Few substances, however mild, can be applied to the eye without occasioning an increased secretion of tears, and the various collyria, which we shall presently have occasion to consider as otherwise useful, may be of service in this way. But certain acrid substances which have been employed merely with a view to increase the secretion of tears, generally do more harm than good.

Authors are much divided in opinion respecting the employment of errhines in ophthalmia. Trnka, who gives cases in which they seemed to be of service, and some others warmly recommend them, while many pronounce them at all times inadmissible.

The sudden determination of blood to the head which they occasion would, a priori, induce us to side with the latter, yet there would seem to be cases in which they may be used with advantage; but as it is very difficult to distinguish those cases, errhines, if not wholly struck out from the catalogue of remedies employed in ophthalmia, must be used with caution, and ought to be among the last remedies we have recourse to.

Two cautions particularly insisted on by Trnka are never to be overlooked in their employment, that they should be delayed

All the excitement has been reduced, and that the more gentle errhines only should be employed. Trnka recommends a mixture of calomel and sugar. "*Vidi solius hujus pulveris usu,*" says a writer quoted by Trnka, "*magnas contumacesque ophthalmias fuisse profligatas.*"

Sialogogues are safer remedies, but little to be depended on. Some assert that they have seen cases, even where the symptoms were considerable, which yielded to these alone. They may be used in three different forms, in the solid, or liquid form, or in the form of vapour. In the first form they are termed masticatoria, because they must be chewed. The pellitory root or horse-radish are used in this way. The liquid form is the least, and that of vapour the most, powerful. Most acrid vapours which are innocent may be employed; that of tobacco is among the best, but its employment requires much caution.

It has been proposed to induce salivation, by mercury received into the system, in the worst cases of ophthalmia, even where no venereal taint is suspected. The benefit derived from this practice it is to be feared would rarely compensate for the trouble attending it. But should it prove successful, its effects might with more probability be ascribed to the well known tendency of mercury to diminish the inflammatory diathesis, than to the increased secretion of saliva.

The remedies which increase the secretion from the skin of the head are more powerful. Trnka relates cases in which they succeeded after every remedy which could be thought of had failed. A general application of watry vapour to the head soon induces profuse perspiration, and if this be supported for some time, paleness of the countenance, giddiness, and at length even syncope.

It seems to be of little use to impregnate the vapour with any of the medicines used in ophthalmia, as it is not from the effects of the vapour on the eye that we expect benefit.

The manner of applying this remedy is very simple; the patient is directed to hang the head over a large bason filled with boiling water, and a piece of flannel is thrown over his head and the bason in order to confine the vapour.

But of all local evacuations none is so effectual as blood-letting. I have already mentioned bleeding from the jugular vein as at once answering the purpose of both local and general blood-letting; the former however is more effectual when performed nearer the seat of the disease.

Opening the temporal artery has been particularly recommended in the severer cases of ophthalmia. "Opening the temporal ar-

“tery,” says Mr. Ware, “is on all hands allowed to be a mode of bleeding the most effectual as well as speedy for the purpose. The near situation of this artery to the seat of the disease cannot but render it peculiarly desirable that blood should be taken from it : but here the two following difficulties lying in the way prevent its being generally used.

“The first is, it often happens that this artery will not yield a quantity of blood sufficient to answer the end : and the second, that troublesome and even dangerous hemorrhagies have been sometimes found to issue from the orifice, at a distance of many hours after the operation.” * * *

“It has been judged necessary to make a complete transverse division of the temporal artery, which has been preferred to barely opening it, as the division would not only cause a derivation of the blood from the part affected, but must also cut off a principal source by which the inflammation was constantly fed : and in this mode of proceeding I have known great relief to be almost instantaneously given to the patient, on whom all other applications had proved ineffectual ; and without any bad consequences whatever.”

Will compression of the temporal artery relieve the symptoms of ophthalmia ?

Of all the modes of employing local blood-letting, there is none so easy, and in general so successful, as that by leeches. They have been applied to the eye-lids, and even to the inner canthus, and it is said, that one applied to the inner canthus will often be of more service than several applied to any other part. By some however we are dissuaded from applying leeches so near the eye, as they are apt to occasion swelling of the eye-lids, and frequently even a temporary increase of the inflammation. Upon the whole, the temple or the cheek appears to be the most convenient place for their application.

Scarifying and cupping the temples or parts behind the ears are often practised with success. Scarifying the back of the head, a common practice in some parts of the Continent, is less effectual.

“But of all kinds of bleeding,” Mr. Ware continues, “that which would be most effectual, if it could be performed without adding to the irritation, is the still more topical mode of bleeding the eye itself. This has been attempted different ways. Some have scraped the conjunctiva with a brush made of barley-beards, while others have opened the inflamed vessels with the point of a lancet ; or if one or two only were distended, have made use of a crooked but sharp edged needle, which they introduced underneath the vessels, dividing them by its edge as it cut its way out.

“ As to the first of these methods, that of bleeding the eye
“ with barley-beards, though I have used it several times, I
“ never found any great or lasting benefit to be produced by it.
“ In a few instances the pain it occasioned was very severe, and
“ the inflammation instead of being lessened was afterwards in-
“ creased; which I could no otherwise account for, than by sup-
“ posing that some of the fine invisible spiculæ were left in the
“ eye. As no care can prevent this accident, it seems to be an
“ insuperable objection to the practice.

“ The two modes last mentioned may be tried in cases where
“ the blood-vessels, connected with a speck on the cornea, are
“ not to be cleared by any of the common methods which are
“ used for the purpose. Yet in both these modes of practice
“ there must always be no small uncertainty; as the simple divi-
“ sion of the vessels has, in very many instances, not been ef-
“ fectual so far to destroy their continuity as to answer the end.
“ This has not uncommonly occurred in my use of them; on
“ which account it has been necessary to take away a small por-
“ tion of the vessels as well as divide them. This I have effected
“ with success by the following operation, and would therefore
“ recommend it to others where the two former are found to fail.

“ The upper and lower lid being kept separate by the hands
“ of an assistant, the vessel or vessels to be operated on must
“ be first raised by a hook or forceps in one hand of the opera-
“ tor, while, with a small pair of curved sharp pointed scissars
“ in the other, he is to cut off the raised and included portion,
“ parallel to the circumference of the cornea. If the vessels
“ lie near enough to one another, two or three may be operated
“ on at the same time; but as all such vessels must be divided,
“ if it cannot be done at once, the operation must be repeated as
“ often as necessary which will depend on the number of these
“ vessels and their relative situation to one another.

“ There is one other particular mode of taking blood from the
“ eye, which in acute inflammation has sometimes been very
“ useful. In the description of the eye prefixed to these re-
“ marks, it has been observed, that blood-vessels, visible in that
“ part of the conjunctiva which covers the inside of the eye-lids,
“ are much more numerous, than those observable in that part of
“ it which covers the globe of the eye. In consequence of this,
“ it always happens in the ophthalmia, that the inflammation is
“ greatest on the inside of the lids; the blood vessels in that part
“ being often not only much increased in number, but also ex-
“ tremely full and turgid. * * * Great benefit has been derived
“ from scarifying them with a lancet, by means of which a con-
“ siderable quantity of blood has been removed. When again
“ the swelling of the everted lids has been very considerable, great
“ and speedy relief has been given by cutting off a portion from
“ each of them with a pair of curved scissars; the loss of blood

“consequent on this, diminishing the general swelling while the reduction made in the size of the lids by the same operation, has caused them almost instantly to return to their natural position.”

It is unnecessary to attempt any addition to these observations on the various ways of employing local blood-letting in ophthalmia. In all the more severe cases of ophthalmia, local and general blood-letting are the remedies on which we chiefly rely. “*Nam ab initio,*” Boerhaave* observes, “*sanguis mittendus est, cum id postea fieri non possit, inflammatione enim ad suppurationem nunc disposita oculus jam perditus est.*” Draw blood therefore, he adds, whether your patient be an infant or an old man, and let the blood-letting be repeated at certain intervals according to the degree of plethora and the urgency of the symptoms.

However powerful in most cases, blood-letting will not always succeed. Boerhaave says he has even seen syncope induced by blood-letting in ophthalmia, and yet the violence of the symptoms little abated. In the more violent cases therefore we should not trust to this evacuation alone, but after the first or second blood-letting, especially if the symptoms are not much relieved, apply a blister to some neighbouring part.

The temples, or parts behind the ear, are the best places for its application. If applied between the shoulders, which is a common practice, it must be very large to be of much service. In obstinate cases it is sometimes proper to shave the head and apply a large blister over it. Boerhaave talks of blistering as a doubtful practice in ophthalmia, and if blisters be employed early in cases attended with fever, they may do harm, as in the other phlegmasiæ, by increasing the vis a tergo; but in the majority of cases, in which ophthalmia is merely a local affection, blistering may be employed early; we still however begin with blood-letting, because its effects are more speedy.

In this, as in all inflammatory affections of the head, rubefacients applied to the feet were once a favourite remedy. In modern practice however, they are laid aside as useless in cases unaccompanied by fever, and hurtful in those which are, by stimulating without occasioning any evacuation.

The pediluvium indeed, which may be regarded as a rubefacient, is still employed, and frequently with advantage, especially where the local affection is considerable compared with the increase of the excitement.

It often happens where relief has been obtained by blistering, that the symptoms increase on the ceasing of the discharge; it is then necessary to support it for some time by dressing the blistered part with issue ointment, and when the ophthalmia has

* Boerhaave's *Treatise de Morbis Oculorum*.

been habitual, in order to prevent its return, we are often obliged to form an issue in some part of the body, (the neck or arm is the most convenient) by which a discharge may be kept up for some months or even years. The issue may be formed in the way just mentioned, by dressing a blistered part with unguentum cantharidum. The pea or seton issue however is less troublesome. A seton in the neck is the most effectual issue in ophthalmia.

If only one eye is affected, the issue should be made on the same side ; this however is not a point of much consequence. I have observed that if the issue is made in the arm, the full effect on the eye is not experienced in less than five or six days. In the neck its effects are rather more speedy.

As it is of consequence to have the issue as near the seat of the inflammation as possible, some have recommended an issue in the lobes of the ears, which Dr. McBride says he has found more effectual than any other in ophthalmia. The lobes of both ears are pierced, and the discharge supported by passing through the holes small pieces of silk wrapt up and covered with ointment, by the quality of which, the discharge may be increased or lessened at pleasure.

Such are the local evacuations employed in ophthalmia. It only remains to consider the various applications made to the eye for the purpose of exciting the debilitated vessels.

Certain eye washes, or as they are termed by medical writers, collyria, have been thought peculiarly adapted to certain kinds of ophthalmia. The opinions on this part of the subject however appear to be too ill established to warrant any division of this kind, the generality of practitioners admitting that nearly the same collyria may be employed in most species of the complaint.

It is true indeed, that some affirm they have found certain collyria most useful in certain species of ophthalmia, but the observations of such writers, so far from agreeing, contradict each other. I shall therefore divide the substances employed in the composition of collyria, not according to the species of ophthalmia to which they are best adapted, but according to the nature of the substances themselves ; and the only division which will be necessary is that of vegetable and mineral ; the division of collyria into stimulant and sedative, adopted by various writers, being merely hypothetical.

Opium and the various fermented liquors afford some of the most powerful collyria derived from the vegetable kingdom. Distilled spirits properly diluted, or what are preferable, some of the astringent wines, which, if strong, must also at first be diluted, are often effectual.

The addition of opium to the wine however renders it far more powerful. Mr. Ware was the first who proposed, or at

least generally employed, this application in ophthalmia, which, from the trials I have made of it, appears to me, particularly in the ophthalmia membranarum, to be one of the best remedies we possess. Mr. Ware's observations on this remedy are well deserving of notice.

"I would particularly recommend," he observes, "the thebaic tincture of the London dispensatory; a medicine composed of opiates and warm aromatics dissolved in mountain wine.—The power of opium, when inwardly taken, to ease pain and induce sleep, has been long known; but its external use is absolutely forbidden by some of the most respectable of the medical profession." * * *

"Authors have said, that blindness and deafness were caused by its application to the eyes and ears. Experience however makes directly against these assertions, and proves beyond contradiction the great efficacy of its outward use in a variety of cases. In the ophthalmia particularly, I have found the thebaic tincture,* wherein opium is the principal ingredient, to be eminently serviceable: and the mode in which I have applied it has been to drop one drop of it into the eye, once or twice a day, according as the symptoms were more or less violent.

"When first applied it causes a sharp pain, accompanied with a copious flow of tears, which continues a few minutes, and gradually abates; after which a great and remarkable degree of ease generally succeeds.

"The inflammation is often visibly abated by only one application of this tincture, and many bad cases have been completely cured by it in less than a fortnight, after every other kind of remedy had been used for weeks and sometimes months without any success. But this speedy good effect is not to be expected in all cases indiscriminately. In some the amendment is more slow and gradual, requiring the tincture to be made use of for a much longer time; and a few instances have occurred, in which no relief at all was obtained from its application. In cases of the latter kind, in which the complaint is generally recent, the eyes appear shining and glossy, and feel exquisite pain from the rays of light.

"However, notwithstanding these symptoms, the application is sometimes found to succeed; and whether it will or not can only be determined by making the trial, which is attended with no other inconvenience than the momentary pain it gives. When it is found to produce no good effect, the use of it must be suspended until evacuations and other proper means have diminished the excessive irritation; after which it may again be applied, and bids equally fair for success as in those instances in which it never disagreed.

* Namely, the tincture prepared with wine.

“ Though I have said that opium is the basis of the thebaic tincture, it is yet necessary to observe, that the manner in which it is here prepared, is that on which its efficacy not a little depends. I have several times applied a strong solution of opium in water without any success. The pain indeed was sometimes lessened for a while, but the inflammation always remained in its full force, as if nothing had been done. A fomentation made with poppy-heads and applied warm has been found comfortable to the diseased part, and in slight attacks of this disorder has been sufficient to remove it ; but in more obstinate cases, it has been repeatedly found ineffectual till the tincture itself was used.

“ That I might judge still more certainly what it was in the thebaic tincture that caused its utility, I have also once or twice made the experiment of the sole application of the other principal ingredient, which is mountain wine. But this I found, while it produced a still stronger irritation in the eye, and of much longer continuance than the tincture, was followed with no kind of benefit.

“ Having thus satisfied myself that neither of the ingredients in their separate state was able to give the relief which they uniformly did when combined in the tincture, I have for a long time past confined myself to the use of the latter, and am warranted from repeated experience to recommend it.* * *

“ As there is some variation in the directions of different dispensatories for making this tincture, it is necessary to be noticed, that the preparation I have used, and which is in common use here, is that of the London dispensatory. Nor is any farther caution wanting as to the application of it, but that should it be found too hot for the eye, which there will always be reason to apprehend, when the patient, instead of being relieved, suffers more violent continued pain after than he did before the use of it, it must then be corrected by the infusion of an additional quantity of opium ; and with this alteration it has been known to succeed in most of the instances in which it had at first failed.”

The heads of poppies boiled in milk have long been employed as a collyrium, and are frequently successful in slight cases.

Camphor and other essential oils are occasionally employed ; the same may be said of the balsams and fetid gums, particularly the gum galbanum. A solution of the extract of the flores sambuci or of camomile flowers, the diluted juice of onions, a decoction of fenugreek seeds, of nutmeg, and many other gently acrid fluids, are sometimes used with advantage. All these collyria however are of comparatively little efficacy.

Those prepared from the more astringent vegetable substan-

ces, oak bark or galls, are sometimes more successful. The gently astringent waters, such as that of roses, form a good vehicle for more active ingredients.

Of the collyria derived from the vegetable kingdom, vinegar is among the most powerful. It may be used merely diluted with water, but is generally combined with some metallic preparation, particularly the preparations of lead, the powers of which it seems considerably to increase.

When the discharge from the eye is considerable and appears to be acrid, whatever other properties the collyria have, they should be mucilaginous. A little gum arabic may be added to them, or they may be prepared with an infusion of the roots or leaves of the marsh mallow, which are supposed to be otherwise useful in ophthalmia.

If we except the preparations of opium, the collyria afforded by the mineral kingdom are more powerful than the foregoing, particularly the preparations of mercury, lead, zinc, and copper. The muriate of mercury, the acetate of lead, and the sulphates of zinc and copper, are the preparations generally employed.

Allum is also used with advantage, especially when the inflammation has become habitual. Many of the salts, particularly nitre and sal ammoniac, are sometimes serviceable. Some of these, as well as the metallic preparations, have at the same time been used internally, particularly the muriate of mercury and sal ammoniac, and occasionally with advantage. I have known a case of habitual ophthalmia which had resisted every other remedy, yield to the internal use of sal ammoniac; and there is reason to believe, that the muriate of mercury taken internally is often serviceable where there is no venereal taint.

To return from this digression: metallic preparations are often advantageously employed in the form of a paste. The tutty-stone, an argillaceous substance impregnated with zinc, or what is called the *calaminaris lapis*, an ore of the same metal, finely powdered and made into soft paste with rose or plantain water, or what is generally preferable, port wine, makes a good application. Calomel is often used in the same way, particularly where the tarsi are much affected.

Of the proportion of the metallic preparation in such applications, nothing need be said. In the collyria where the metallic preparation is dissolved, the proportion demands particular attention; and injury is sometimes done by making it too large, particularly at an early period. From one to two or three grains of any of the foregoing metallic preparations, for each ounce of the collyrium, is the best proportion to begin with.

Such are the principal substances employed in the composition of collyria; it would be endless to enumerate all that have been

used. In Boerhaave's Treatise "*De Morbis Oculorum*," and some others on this complaint, the reader will find very complex formulæ for collyria, which do not seem, however, to have any advantage over the more simple forms now commonly employed.

Complex formulæ should always be avoided, except where some very considerable advantage is expected from them, as they tend constantly to render the practice feeble and uncertain : Uncertain, because where the medicines employed are numerous, it is often impossible to say to which the effects are to be ascribed : Feeble, because this uncertainty prevents our pushing to the proper extent the medicine from which the favourable change if such has taken place, proceeds. In simple formulæ the effects of any ingredient are readily perceived, and according to these we increase or diminish the dose, or have recourse to some other medicine. The simplification of formulæ indeed is one of the greatest improvements which the practice of medicine underwent during the last century.

There is some difference of opinion respecting the proper temperature of collyria. Hoffman and some other writers advise them to be applied tepid ; the generality of practitioners use them cold. It would appear that when the symptoms are not very considerable, cold collyria are most beneficial. When the inflammation is violent, very cold collyria may increase the tendency to gangrene ; when this tendency is apparent, the collyria must always be tepid.

The medicines we have been considering are sometimes used in other forms. It has already been observed, that it is often proper to employ ointments to prevent the tarsi being glued together, and to defend the inflamed parts from the acrid exudation which frequently attends ophthalmia, particularly the ophthalmia tarsi. These ointments are made to serve a double purpose, by impregnating them with some of the foregoing substances. The metallic preparations in particular are frequently employed in this way. The unguentum hydrargyri nitrati is one of the most powerful remedies in the ophthalmia tarsi.

Sir Hans Sloan's celebrated ointment for ophthalmia is the unguentum tutiæ and the sulphate of zink rubbed with butter. Sir John Pringle recommends the acetate of lead rubbed with the white ointment and a little of the traumatic balsam.

The applications to the eye are sometimes made in the form of poultice, which is by far the most exceptionable ; the effects of the ingredients being generally more than compensated for, by the increase of temperature occasioned by the poultice. If medicated poultices are inadmissible, those which are merely emol-

lient are still more exceptionable.* Both the one and the other indeed are now very generally abandoned.

The only case of ophthalmia perhaps in which poultices are proper, is where an evident tendency to gangrene has taken place ; then warm emollient and astringent poultices are serviceable. If there is any other case of ophthalmia where poultices are proper, it is in the ophthalmia tarsi after suppuration, leaving small ulcers of the tarsi which do not readily heal. If the poultice is not found to increase the inflammation, or make it spread to the eye, it will often be serviceable. There is no poultice we can apply however so generally successful in such cases as the unguentum hydrargiri nitrati. Other escharotics, the application of which requires great caution, are occasionally employed when the ulcers prove obstinate, and it is sometimes judged proper to lay open the spaces between the small ulcers with a scalpel ; but all such cases come under the department of the surgeon.

There is still another way of employing the substances used in collyria, in the form of vapour. The high temperature and irritation attending the employment of vapours however, notwithstanding they are strongly recommended by some respectable practitioners, generally more than counterbalance any advantage to be expected from them.

One application remains to be mentioned, which cannot be arranged under any of the foregoing heads ; electricity is frequently employed in languid habitual ophthalmia, but rarely with success. I have often seen it used without benefit, and have conversed with old practitioners who had never met with one case of ophthalmia in which any considerable advantage was derived from it. " Its beneficial effects," Dr. Cullen observes, " are seldom permanent, and even its frequent repetition seldom produces an entire cure."

The mode of applying electricity is very simple. Sparks, not shocks, should be taken, and the sparks should at first be very gentle. I have seen a very languid ophthalmia evidently increased when the sparks were severe ; it is proper however to use a large machine, that they may succeed each other rapidly. The patient's feelings will best regulate the strength of the sparks. If he cannot bear sparks of any strength, the stream must be directed on the eye by the pointed wood held at some distance from it ; if even this be too severe, it must be directed by a sharp metallic point held at a greater distance from the eye.† In short,

* " I knew an instance where by the repeated application of an injudicious poultice a suppuration of the eye was brought on, which had nearly proved fatal." Mr. Rowley's Treatise on Ophthalmia.

† See the works of Cavallo and others on Medical Electricity.

electricity must be exhibited in such a form that its application may be continued for some time.

Such are the various means employed in ophthalmia. It appears from what has been said, that in different cases they are to be variously combined. The treatment should always commence with the use of a collyrium, and as those containing metallic preparations are most generally successful, they should be first employed. In moderate cases of ophthalmia membranarum, these, with gentle laxatives, are in general the only remedies necessary.

If the inflammation resists the common collyria, the tincture of opium, prepared and employed as Mr. Ware recommends, should be had recourse to. If the tarsi are affected, it will be proper to employ at the same time some of the ointments above mentioned ; those will be found most generally successful which contain some metallic preparation.

If the symptoms are not severe, the use of the collyria and ointments should be continued for some time before we employ other means, because, although the symptoms do not at first remit, they often yield to their continued application, and the other means employed in ophthalmia are more troublesome and debilitating. When however the symptoms are more severe, or have been of long standing, we must at the same time have recourse to other remedies.

Local blood-letting generally affords the most immediate, blistering the most permanent, relief. If the symptoms are very considerable, both are necessary ; then although there be no fever, the local blood-letting should precede the application of the blister.

When ophthalmia produces fever, it is a true phlegmasia ; all the general means employed in the phlegmasiæ are then to be conjoined with the local remedies, and properly adapted to the degree of fever present.

Upon the whole, the best rule in the treatment of ophthalmia is, as far as we can, to depend on the simplest remedies, those which put the patient to least trouble, and tend least to debilitate ; and as the disease increases or becomes obstinate, to have recourse to a more complicated practice.

When we have succeeded in removing ophthalmia, it is often necessary to use means to prevent its return ; on the use of issues for this purpose, I have already had occasion to make some observations. But ophthalmia seems often connected with a debilitated habit, and then the best means of preventing its return are those which tend to strengthen the vessels of the eye or the system in general, and such means will sometimes even remove habitual ophthalmia when all others have failed.

One of the most powerful of these is the cold bath, which may be employed either by immersing the whole body, or letting the water fall suddenly on the head, which for the prevention or cure of ophthalmia is perhaps the best mode of using the cold bath. Shaving the head and merely applying to it every morning a cloth dipt in very cold water, and even applying cold water to the eyes themselves or behind the ears, are serviceable in preventing the return of ophthalmia, or removing it after it has become habitual.

For the same purposes the bark and wine have often been successfully employed.

Ophthalmia has sometimes accompanied the fits of an intermittent ceasing during the apyrexia, and has sometimes continued to recur at certain intervals after the fever has been removed. In both these cases the bark given during the intervals is the best means to prevent its recurrence.

A variety of other medicines have been employed internally to prevent the return of ophthalmia, and for the removal of the chronic form of the disease; the cicuta, flores arnicæ montanæ, &c. Little however is to be expected from them. The German leopard's bane has been of little or no service in many complaints in which it has been celebrated, and therefore we are led to question any effects attributed to it.

With regard to the various consequences of ophthalmia enumerated when treating of the symptoms of this complaint, as they come under the department of the surgeon, their treatment is not to be considered here.

CHAP. VIII.

Of Otitis and Odontalgia.

INFLAMMATIONS of the ear and of the teeth and neighbouring parts, like inflammation of the eye, are for the most part unaccompanied by fever, the latter indeed almost uniformly so, and rather belong therefore to simple inflammations than to the plegmasiæ. As they are generally unattended with danger, it will not be necessary to consider them at length.

Very few nosologists, for what reason it does not appear, have admitted Otitis into their systems, which is the more remarkable, because, although while unaccompanied by fever, if we overlook the sufferings of the patient, which even in this case are often great, it is a complaint of little importance; when attended with fever, it often assumes a very formidable appearance,

delirium, coma, and convulsions sometimes supervene, and it has even terminated fatally.

Vogel has given it a place in his nosology. It is his 48th genus, and the 4th of the complaints termed inflammatoriæ. He defines it,

“*Inflammatiõ auris internæ, dolor immanis in aure, febris, cephalalgia, agrypnia, delirium.*”

According to the mode of arrangement we follow, it may be defined,

Phlegmasia cum dolore auris internæ, sæpe cum delirio.

This definition, it is evident, applies only to otitis accompanied with fever.

Otitis is produced by the same causes with other inflammations, by none more readily than partial exposure to cold.

In the treatment of otitis we proceed on the same principles as in that of ophthalmia. While it is merely a local affection, local remedies alone are necessary, if we except gentle cathartics for the purpose of removing any cause of irritation lodged in the primæ viæ. Local blood-letting, and blisters applied behind the ear, are the means to be chiefly relied on. As the inflammation is confined to the internal parts, warmth applied at an early period to the external ear and its neighbourhood often brings relief.

If the pain is not soon abated, and still more if it continues to increase, we may expect suppuration. When however the pain has been confined to the ear, and there is little or no fever, suppuration is not to be dreaded. When the abscess bursts, the matter is discharged by the meatus auditorius externus. It is then proper to syringe the ear from time to time with some mucilaginous and gently astringent decoction.

The treatment must be very different when the pain spreads from the ears over the whole or a great part of the head, attended with fever, and still more if delirium, coma, and convulsions supervene. It may then, Vogel observes, prove fatal even on the first day, and very often destroys the patient before the seventh.

The most powerful local and general means are then to be combined. In such cases there is reason to believe that the inflammation has spread to the brain, and the treatment is the same as in phrenitis.

Even the most violent forms of otitis however more frequently terminate in suppuration than in death, and if the brain has partaken of the inflammation, the suppuration of the ear generally relieves it.

But suppuration is more formidable in the more violent, than

in the milder cases of otitis. The structure of the whole internal ear is often destroyed, the bones being discharged through the meatus auditorius with much purulent, and often fetid matter. It is almost unnecessary to observe, that in such cases the sense of hearing in the ear affected is wholly lost.

Fistulous ulcers of the internal ear are sometimes the consequence of suppuration, which prove very troublesome, and may even be fatal by spreading to the brain.

Most nosologists have given a place to Odontalgia. It is Dr. Cullen's 23d genus, and the 17th of his phlegmasiæ. He defines it,

"Rheumatismus vel arthrodynia maxillarum a carie dentium."

The tooth-ach is so rarely attended with fever, that there is no form of it which can be regarded as a phlegmasia. It belongs entirely to the class of local diseases.

Sauvages makes seven varieties of tooth-ach, dividing it according to the causes which produce it. 1. Odontalgia from a carious tooth; 2. from scurvy; 3. from catarrh; 4. from gout; 5. from child-bearing; 6. from an hysterical habit; 7. from affections of the stomach. Besides these, tooth-ach may arise from any of the causes of inflammation.

I have known it so intimately connected with the state of the stomach, that for two months it constantly returned on the patient's taking any solid food. Even one mouthful of bread was sufficient to occasion such a paroxysm of pain, which generally continued from half an hour to two or three hours, that he was almost starved, being supported solely by strong soups and other fluids, no quantity of which he found capable of affording sufficient nourishment, or even of allaying the calls of hunger. It was observed in the first volume, that fluids, however nutritious, if unmixed with any solid matter, are very imperfectly digested.

As tooth-ach is merely a local affection, local remedies alone are for the most part necessary; and these are so generally known that it is needless to point them out here.

Where the tooth is apparently sound, a large dose of opium may be tried previous to extraction. This will always afford temporary relief, and by promoting the perspiration, if the complaint rather proceeds from cold than any fault of the tooth, will often entirely remove it. A small dose, by quickening the circulation, often does more harm than good. When tooth-ach arises from the state of the stomach, an emetic will frequently give relief, and in such a case as that just alluded to, where it has become habitually connected with the state of the stomach, stomachic medicines, particularly bitters and steel, afford a probable chance of a cure.

The means of preventing the tooth-ach, which is always sooner or latter attended with decay of the teeth, demand serious attention. I believe they may all be arranged under three heads, cleanliness, means of obviating the effects of cold, and those of strengthening the gums.

To keep the teeth perfectly clean, they should after every meal be freed of the small pieces of aliment which often lie between them. till they putrify, and thus hurt the enamel. The concretion which is apt to form on the teeth should be prevented by carefully brushing them, and as soon as any appears it ought to be removed.

The effects of cold on the teeth are best obviated by habituating them to its application, which may most effectually be done by washing the mouth repeatedly every morning with cold salt and water.

If the tendency to tooth-ach proceeds from a fault in the gums, this must be corrected by strengthening the system in general, and frequently washing the gums and applying to them astringent powders. The powder of bark is one of the best.

CHAP. IX.

Of Cynanche.

DR. CULLEN defines cynanche, which is his 10th genus, and the 4th of his phlegmasiæ,

“Pyrexia aliquando typhodes ; rubor et dolor faucium ; deglutitio et respiratio difficiles, cum angustia in faucibus sensu.”

This complaint he divides into five species, in all of which the symptoms, and in some the mode of treatment, are very different. These differences arise partly from the nature of the organs affected in the different species of cynanche, and partly from less evident causes.

Dr. Cullen's first species is the cynanche tonsillaris, which is defined,

“Cynanche membranam faucium mucosam et præcipue tonsillas tumore et rubore afficiens, cum febre synocha.”

Dr. Cullen's second species I had frequent occasion to mention in treating of the scarlatina, the cynanche maligna. It is defined,

“Cynanche tonsillas et membranam faucium mucosam afficiens tumore, rubore, et crustis mucosis coloris albescentis vel cineritii, serpentibus et ulcera tegentibus ; cum febre typhode et exanthematibus.”

Dr. Cullen's third species of cynanche, the *cynanche trachealis*, he defines,

"Cynanche respiracione difficili, inspiratione strepente, voce rauca, tussi clangosa. tumore fere nullo in faucibus apparente, deglutitione parum difficili et febre synocha."

The fourth species is the *cynanche pharyngea*.

"Cynanche cum rubore in imis præsertim faucibus ; deglutitione maxime difficili, dolentissima ; respiracione satis commoda et febre synocha."

The last species, the *cynanche parotidæa*, is defined,

"Cynanche cum tumore externo parotidum et maxillarum glandularum magno ; respiracione et deglutitione parum læsis ; febre synocha plerumque leni."

The only alterations I would propose in those definitions, are to suit that of cynanche to the mode of arrangement I follow, and to include in the definition of the *cynanche tonsillaris* that of *cynanche pharyngea*. These varieties of cynanche differ considerably when they are exquisitely formed. But the one is seldom present in any considerable degree without being attended with more or less of the other. Dr. Cullen declares indeed that he never saw a case of the true *cynanche pharyngea*, that is, a case in which the inflammation was confined to the pharynx; it constantly spread in a greater or less degree to the tonsils and neighbouring parts. Besides, the mode of treatment is in almost every instance the same in both cases. And it will appear, from what is about to be said of the symptoms of these forms of cynanche, that if we admit the *cynanche pharyngea* to be a distinct variety, we must admit another, the *cynanche œsophagea* for the inflammation we shall find frequently attacks the œsophagus, and is sometimes even confined to it.

The following may be assumed as the definition of cynanche :

Phlegmasia pulsu plerumque valido et duro, nonnunquam debili, cum rubore et dolore faucium, respiracione et deglutitione difficili, cum angustæ in faucibus sensu.

The first species of cynanche then, according to the mode of arrangement I shall follow, includes the inflammation of the tonsils, velum pendulum, uvula, pharynx, and œsophagus. As the tonsils are the parts in most cases principally affected, and it is rare for the others to be affected without some affection of them, we may, for the sake of brevity, assume the term *cynanche tonsillaris* to express the inflammation of these parts ; which may be defined,

Cynanche, membranam faucium et pharyngis mucosam præcipue tonsillas tumore et rubore afficiens, deglutitione difficili nonnunquam dolentissima, pulsu valido et duro.

The only alteration, which the mode of arrangement I follow renders necessary in the other definitions, is to insert, *pulsus validus et durus* and *pulsus debilis*, instead of *synocha* and *febris typhodes*; symptomatic fevers, according to that mode of arrangement, forming a class of diseases distinct from the idiopathic.

SECT. I.

Of the Cynanche Tonsillaris.

1. Of the symptoms of the cynanche tonsillaris.

THE cynanche tonsillaris generally begins with an uneasy sense of tightness about the fauces, which, when the inflammation occupies the pharynx, is deeper seated than when it occupies the tonsils and neighbouring parts.

The deglutition soon becomes more or less difficult and painful; in the former case more so than in the latter, for while the inflammation is confined to the tonsils, *velum pendulum palati*, and *uvula*, the pain is rather while we are preparing to swallow, or in the very first act of swallowing, than during deglutition. In most cases however, more or less of the inflammation spreads to the pharynx, and then the pain peculiar to both forms of the complaint is perceived.

On inspecting the fauces, the parts, as far as the inflammation extends, appear swelled and of a more florid red than natural, and here and there, particularly on the tonsils, small white or yellow specks are often observed. While these remain of a light colour, and the pulse continues sufficiently strong and full, they never indicate danger.

The inflammation is generally confined to the parts which can be brought into view; it sometimes however extends along the *œsophagus*, which is known by the greater difficulty and pain of swallowing as well as by the seat of the pain. In some rare cases, we have just seen, the inflammation is wholly confined to the *œsophagus*. In these no morbid appearance presents itself on inspecting the fauces.

Whether the *œsophagus* be primarily affected, or the inflammation has spread to it from the fauces, it is a very alarming accident. Cases have occurred in which, the cavity of the *œsophagus* being wholly obliterated by the swelling, the patient has been literally starved to death. Even in less violent cases the pain of swallowing is sometimes such, that the patient abstains from aliment, and some have sunk under the debility thus occasioned.

The deglutition is now and then impeded by the inflammation's spreading in an opposite direction. It is not very common for

the tongue to be affected in cynanche ; in some cases however it has been so much swelled as to fill the mouth and wholly prevent deglutition, nay, it sometimes, Tissot observes, becomes too large to be retained in the mouth, and is thrust out assuming a purple colour.

The pain during deglutition in cynanche seems often in a great degree to depend on the muscles employed in deglutition partaking of the inflammation ; hence it seems to be that fluids, contrary to what we should, *a priori*, suppose, are swallowed with more pain than solids ; in the former case, a greater number of muscles being employed, and those employed in both cases acting more powerfully. The patient feels most difficulty in swallowing the saliva, partly owing to its being a fluid, and the quantity being small, and partly to its becoming more viscid than natural.

In some cases however the saliva becomes thinner than natural, and is poured out in great quantity. The increased flow of saliva, although it often relieves the symptoms, sometimes proves a source of much uneasiness. If the inflammation runs high, the exertion of spitting it out is attended with considerable pain ; and when the inflammation, as happens in all the severer cases of cynanche tonsillaris, extends to the pharynx, the pain of swallowing it is much greater.

When the inflammation is very considerable indeed, especially when it extends to the œsophagus, the pain of swallowing the thin saliva is sometimes such as to throw the patient into convulsions ;* and what adds to his distress is, that to avoid swallowing it is not always optional, for the irritation it occasions frequently excites involuntary attempts to swallow. This is particularly apt to happen during sleep, as the saliva is then permitted to accumulate in the fauces, and it is generally owing to this cause, that the patient often starts with horror from his sleep. In such cases the only situation in which he finds relief is lying with the head over the bed, and permitting the saliva to run from the mouth.

This symptom often prevents sleep ; but many are of opinion, that sleep, where the throat is much inflamed by permitting the morbid secretion to accumulate in it, is injurious, and it is certain that during sleep this complaint seems often to gain ground. Tissot says that the irritation of the saliva is not hurtful by preventing sleep, which he has often observed to do much harm, those who had been almost well becoming, during some hours of sleep, nearly as ill as ever.

* Tissot says he has seen women in this complaint thrown into convulsions from excess of pain every time they attempted to swallow the saliva. In the 3d vol. of the Physical Essays the reader will find a case related by Dr. Monro, which in a striking manner exemplifies this symptom.

The irritation occasioned by the accumulation of mucus in the throat often excites frequent attempts to vomit, which may be mistaken for an indication of a foul stomach.

The pain is generally greatest when the patient attempts to swallow lying on the back; and when the œsophagus is much affected, the pain is often felt chiefly in the back, and is of the same kind with that produced by any acrid or bulky substance passing along the œsophagus, which most people have experienced.

If the pharynx is much affected, and still more if the complaint has spread to the œsophagus, when the patient attempts to drink, the fluid, instead of passing to the stomach, is often returned by the mouth, thrown through the nose, or into the wind-pipe exciting a violent fit of coughing.

The inflammation in cynanche is not apt to spread to the stomach. I had occasion to observe, in speaking of erysipelas, that that species of inflammation sometimes spreads along the œsophagus to the stomach; but erysipelas of the fauces, which is more uniformly diffused, generally of a darker red, and attended with little swelling, has a very different appearance from the cynanche tonsillaris.

When the inflammation spreads to the trachea, the danger is very great. It may then occasion suffocation. But the inflammation of the wind-pipe forms a distinct species of cynanche according to the foregoing division; at present therefore it would be improper to enter farther on its symptoms: it is sufficient to have remarked that we may sometimes look for a concurrence of these forms of cynanche.

But although the inflammation spread no farther than the fauces properly so called, the breathing is often considerably affected. The more, we have seen, the complaint partakes of the cynanche pharyngea, that is, the more the inflammation spreads towards the œsophagus, the more difficult is the deglutition; it is the reverse with respect to the respiration, for if the inflammation be wholly confined to the pharynx and œsophagus, however violent it may be, the breathing is always free, but when the chief seat of the complaint is in the tonsils, velum pendulum palati, and uvula, the passage of the air to the lungs is much contracted, and sometimes almost closed; that by the nose frequently is so, and the patient can only breathe with the mouth open.

In such cases it might be imagined that deglutition is wholly interrupted. This however very rarely happens, except where the tongue partakes considerably of the swelling, the tonsils, velum pendulum palati, and uvula being very compressible.

The voice is often affected, becoming hoarse, being sometimes almost lost, especially where the swelling is considerable. The affection of the voice however is rather a symptom of the cynan-

che trachealis than tonsillaris, and never attends the exquisitely formed cynanche pharyngea or the cases in which the inflammation is confined to the œsophagus.

None of the neighbouring parts partake so frequently of the pain in cynanche as the internal ear. The patient, for the most part, at first complains of a ringing in the ear, and a sense of rattling in it when he swallows, which often become a severe pain. There is reason to believe that the inflammation frequently spreads along the eustachian tube; in many cases the pain can be distinctly felt extending through it to the internal ear. A degree of deafness which frequently attends violent cases of cynanche is probably owing to the swelling occasioned by the inflammation's obliterating this cavity. If the deafness is complete, as sometimes happens, it must arise from some other cause, or some other in conjunction with this.

When the symptoms of cynanche are very considerable, the whole face partakes of it, the eyes are inflamed, the cheeks swelled and florid. I have already had occasion to observe, that the muscles employed in deglutition generally partake of the inflammation; in the more violent cases it often spreads to almost all the muscles and more external parts of the neck, which become stiff, hard, swelled, and sometimes red, and the sublingual and other glands in the neighbourhood are often considerably enlarged. This affection of the external parts frequently relieves the internal. The swelling which appears externally however, in many cases, proceeds not from the disease spreading to neighbouring parts, but from the swelling of the internal fauces. The enlarged tonsils in particular may often be perceived externally.

Many of the foregoing symptoms appear only in the more severe forms of the disease. In mild cases it is common for the inflammation to be chiefly confined to one of the tonsils at the commencement, and to leave this tonsil, or in some measure to leave it, when it attacks the other.

Such are the local symptoms of the cynanche tonsillaris. It appears from what has been said, that the difference between the symptoms of cynanche occupying the tonsils, velum pendulum palati and uvula, and that occupying the pharynx, consists chiefly in the former being often attended with some difficulty of breathing, on account of its having its seat in the passage which the air takes to the lungs; and in the latter being attended with more difficulty of swallowing, from its affecting parts more essentially concerned in the act of deglutition.

In cynanche pharyngea, we have seen, the inflammation sometimes spreads to the œsophagus, and the deglutition is wholly interrupted. On this account the cynanche pharyngea is a more dangerous complaint than the cynanche tonsillaris strictly so

called. For the most part, it is only as the latter shews a tendency to be accompanied by the former, or by the cynanche trachealis, that it is attended with much danger. It is very rare for the swelling of the tonsils, velum pendulum, and uvula, to increase till it occasions suffocation. This however has sometimes happened.

The foregoing symptoms are seldom present to a considerable degree without being attended with symptoms of general derangement. In the mildest cases of cynanche tonsillaris the fever is hardly perceptible, and it never is so considerable, in proportion to the local symptom in this form of cynanche, as in the cynanche trachealis and maligna.

In proportion as the inflammation spreads towards the œsophagus, the febrile symptoms are more considerable. But the local symptoms never run high in any form of the complaint without the pulse becoming stronger, harder, and more frequent than natural; and all the usual symptoms of fever generally soon shew themselves. The thirst is often very considerable in proportion to the other febrile symptoms, particularly when the œsophagus is inflamed.

It sometimes though very rarely happens, that the febrile symptoms run so high as to endanger life. Even delirium and coma sometimes supervene. Whether in such cases the brain or its membranes are affected (which there is reason to believe) has not been determined.

Those who have seen only the more common cases of cynanche tonsillaris, can form little idea of the appearance which it sometimes assumes. As the return of the blood, Boerhaave observes, is obstructed in the external jugulars by the swelling of the neighbouring parts pressing on them, and he might have added as Van Swieten has done, in all the veins of the neck by the dyspnœa impeding the passage of the blood through the lungs, a swelling of the face, tongue, lips and fauces is the consequence; the tongue is thrust out, distorted and inflamed; the eyes are red, swelled, frightfully staring, and pushed from their sockets; the brain is compressed and overpowered, the sight, hearing, and touch being impaired. In some cases the patient becomes delirious, lies with the mouth open, snores, and is obliged to be supported in nearly an erect posture to prevent suffocation. There is frequently also, he continues, redness, swelling, pain, and pulsation in the external fauces, neck, and even breast; hence, he adds, the jugular veins with those of the forehead and under the tongue become distended with varices.*

The cynanche tonsillaris, like other inflammations, may terminate in resolution, suppuration, gangrene, or schirrus. The two former are common, the two latter very rare.

* Aph. Boerh.

Resolution is at all times a favourable termination, and, in the present case, suppuration, although troublesome, is seldom attended with danger. If indeed the suppuration of the fauces is very general, even although the trachea is not affected, the matter may be suddenly poured into it, and induce suffocation, which, Van Swieten and others assert, sometimes happens; it is so rare an accident however that it is hardly to be feared.

When suppuration takes place, the febrile symptoms abate, the throat becomes paler and less painful, and sometimes a sense of pulsation is felt, or if it has been present at an earlier period, becomes more sensible. We know that the abscess is ripe by a small white soft tumour appearing about the centre of the inflamed parts.

The quantity of pus discharged from such abscesses is often very considerable, and sometimes of an almost intolerable taste and smell.

The abscess sometimes points at a more concealed part; the surgeon must then feel for it with the finger, when there is reason to believe it formed. There is always reason to suspect the presence of an abscess, when the patient, after the febrile symptoms are abated, experiences a considerable difficulty of swallowing although the inflammation is evidently diminished, is restless and complains of a general pain in the mouth, with slight and irregular shiverings. The pulse, Tissot observes, is then soft without being natural, there is a sense of weight in the tongue, small white spots often appear on the gums and inside of the cheeks, and the patient complains of a disagreeable taste and smell.

"Cynanche tonsillaris," Dr. Cullen remarks, hardly ever "terminates by gangrene, although in this disease some sloughy spots, commonly supposed to be the forerunners of gangrene, sometimes appear upon the fauces." By other writers however who seem to have met with the complaint in a more violent form, gangrene is regarded as rather a more frequent occurrence.

When gangrene does supervene in the cynanche tonsillaris, the event is almost always fatal. How shall we, says Van Swieten, support the patient's strength when the organs employed in deglutition are destroyed by gangrene, and the adjacent parts affected with that inflammation by which nature attempts to separate the dead from the living parts?

Like suppuration, the gangrene is sometimes situated in parts which cannot be brought into view. From the course of the complaint however, and the state of the symptoms in general, we may always readily determine its presence.

When gangrene is about to succeed, Dr. Mead* observes, the

* *Monita et Præc. Med. cum notis Wintringhami.*

tonsils and neighbouring parts, which a little before were tense, red, full of moisture, swelled, and shining, now suddenly appear flaccid, dry, unequal, pale, brown, livid, and as if they had been bruised. The pulse, in the mean time, loses its strength, and subsultus tendinum, coldness of the extremities, a clammy cold sweat, great anxiety, foam in the mouth, a degree of coma, and wandering of the mind appear, and may be regarded as the forerunners of death.

Upon the whole, when both the local and general symptoms have been unusually violent, and the means employed have failed to procure any considerable remission; when the pain and inflamed appearance of the fauces are suddenly diminished, the deglutition rendered easier, the pulse from being strong becomes small, weak, and irregular, the face assumes a cadaverous appearance, the extremities become cold, and the breath fetid, although we cannot perceive the gangrene, we may be assured that it has taken place.

The cynanche tonsillaris still more rarely terminates in schirrus.* Tissot observes that he has seen the cynanche tonsillaris terminate in mortification or schirrus when treated with heating medicines, in order to force out sweats, but that this complaint, if properly treated, never terminates in either of these ways.

Like other febrile diseases, cynanche is sometimes relieved by a critical discharge, a flow of sweat, or a diarrhœa. The increased flow of saliva is sometimes so great, and attended with such relief, as to deserve the name of critical. Dr. Sims† observes that it generally comes to its height on the fifth or sixth day.

2. Of the Causes of Cynanche Tonsillaris.

Like the other phlegmasiæ, the cynanche tonsillaris is most apt to attack the youthful, robust, and plethoric, especially those of a sanguine temperament. It is a remark of Sydenham that those who have red hair are most liable to it. Quarin thinks that men are more subject to it than women.

Spring and autumn are the seasons at which it is most frequent. In summer it hardly ever appears. Both Quarin and Van Swieten mention cases in which it appeared periodically, regularly attacking the patient in the spring or autumn. Such cases indeed are not very rare.

In its exciting causes also, the cynanche tonsillaris agrees with the other phlegmasiæ. Cold, particularly if alternated with a high temperature or partially applied, is still the chief exciting cause. Sudden vicissitudes of temperature, Quarin‡ observes,

* Mead's Mon. et Præc. Med. cum Notis Wintringhami, vol. i. Quarin de Feb. Aph. Boerhaav. cum Com. Van Swiet. de Angina.

† Dr. Sims on Epidemic Diseases.

‡ De Febris.

cold air passing through chinks or open doors especially if it fall on the neck, riding against a cold wind, much singing or vociferation, the blowing of wind instruments, acrid aliments, medicines, or poisons, the suppression of accustomed evacuations, and a peculiar state of the atmosphere, are the exciting causes of inflammatory angina.

With respect to the last of these causes, of which much has been said, if we except cold, damp, and variable weather, there does not appear to be any peculiar state of the atmosphere which tends to produce this complaint.

When cynanche arises from any one of the causes which have been mentioned, it is usually a very mild complaint. It is when more than one have been applied, when, for example, the patient has been exposed to cold during very moist and variable weather, and is of a sanguine and plethoric habit, that it assumes a more alarming form.

3. Of the treatment of Cynanche Tonsillaris.

There is a striking resemblance between the treatment of the inflammatory sore-throat and ophthalmia; the chief differences arising from the nature of the part affected, and from the former being more frequently a febrile disease.

I shall follow the same order here as in considering the treatment of ophthalmia; in the first place taking a view of the means employed in the simplest cases, and afterwards pointing out in what way the practice must be rendered more complicated as the symptoms become so.

In many cases of cynanche tonsillaris we employ only local means. These may be divided into two classes, those applied to the internal, and those applied to the external fauces. In the mildest forms of the complaint the former only are necessary.

The remedies applied to the internal fauces consist chiefly of mixtures for washing the inflamed parts, the composition as well as the effects of which are analogous to those of collyria in inflammation of the eyes.

The gargles employed in inflammatory sore-throat may be divided into four classes, according to the different objects we have in view in employing them. 1. Those employed for the purpose of procuring resolution. 2. Those proper when suppuration is unavoidable. 3. Those proper when the abscess has burst spontaneously or been laid open; and, 4. Those which are necessary when a tendency to gangrene has supervened.

The purposes for which these different gargles are employed point out what their composition ought to be. In the use of the first class our object is, by their stimulating, and what has been

called cooling properties, to diminish the inflammation ; by their mucilaginous property to defend the parts when the saliva is thin and acrid ; and by their detergent quality to cleanse the parts when clogged with thick viscid mucus.

The first purpose may be answered by the vegetable and mineral acids, vinegar, the juice of acidulous fruits, the vitriolic and marine acids properly diluted, &c. ; also by some of the neutral salts, particularly nitre and sal ammoniac, by alcohol in various forms, and many of the gums, particularly myrrh, the tincture of which properly diluted, forms an excellent gargle. The same may be said of many other acrid substances, the volatile alkali, capsicum, horse-radish, mustard, &c. Astringent substances, particularly allum, and Peruvian and oak bark, are employed with advantage.

When the gargle should be mucilaginous, we may add to it sugar, gum arabic, or the white of egg, or use a decoction of some of the mucilaginous herbs.

When the fauces are clogged with thick mucus, the application should be more stimulating ; a mixture of honey and the marine acid is often employed with advantage ; Sydenham recommends the sulphuric. These must be applied with a pencil. A principal part of their effects seems to depend on their increasing the flow of saliva, by which the mucus is diluted and washed off.

But if the disease has continued for a considerable time with little remission, especially if the pain abates while the swelling still continues or increases, we have little hopes of procuring resolution. Our view then is to induce a speedy and favourable suppuration, and for this purpose gargles of a different kind are proper.

They should consist entirely of warm emollient fluids, and be used in large quantity. "*Sed hoc primo elapso tempore,*" namely, the time during which there is hope of resolution, "*emollientia et demulcentia præscribi solent, e lacte nimirum, radicibus althææ, floribus malvæ, seminibus lini, caricis pinguibus, gummi arabico,*"* &c.

In short, here, as in the former case, the composition of the gargle is readily determined by reflecting on the end we have in view. It is no longer our wish to diminish the inflammation, we therefore avoid those applications which tend to relieve it, the gargle ought therefore to be mild. We wish to promote suppuration, nothing for this purpose is so powerful as the application of warmth, the gargle should therefore be used warm, and in large quantity, that its temperature may not be suddenly reduced.

* Lieutaud's Synopsis Prax. Med.
Vol. II.

The best way of using this gargle is from time to time to permit as large a quantity as can conveniently be retained to lie on the part till it acquires the temperature of the mouth.

After the abscess has burst, our view is to dispose the parts to heal, then emollient and gently astringent gargles are the best.

If a tendency to gangrene should appear, we must immediately have recourse to antiseptic gargles, improperly so called indeed, because it does not appear to be any antiseptic power acting on the putrifying parts but their peculiar stimulus acting on those which still retain their vitality, that is serviceable.*

The best of these gargles is composed of the bark and port wine. If the parts lie within reach, they should be scarified and touched with more stimulating applications. But the treatment in such cases we shall presently have occasion to consider more fully. It is the same with that of cynanche maligna with this difference, that, as gangrene in cynanche tonsillaris is the consequence of increased excitement, we must, especially on the first appearance of the gangrene, be cautious in the use of means which tend to increase the inflammation, lest we rather increase than diminish the tendency to gangrene.

Such are the various applications to the internal fauces employed in cynanche tonsillaris. There has been some difference of opinion respecting the best way of applying them. Gargling is the best means of washing the internal fauces ; but the motion of gargling sometimes increases the inflammation, so that many dissuade from it in the cynanche tonsillaris. In the milder cases the motion in gargling never does harm. In the more severe it is proper to avoid it. The medicine should then be thrown into the fauces by means of a syringe, or something should be given which may be swallowed.

In the worst cases however the deglutition is interrupted, and even washing the parts with a syringe is found to increase the inflammation. In such cases the medicine must be gently dropped on the parts affected, applied with a piece of lint or made thicker and applied with a pencil, or, as Sydenham recommends, merely kept in the mouth for some time and then allowed to run out.

Where the deeper-seated parts are affected, swallowing is the only means we have for making any application to the inflamed part, and it unfortunately happens, we have seen, that in these cases swallowing is most difficult and painful, and most frequently interrupted. When the pain occasioned by swallowing is very great, it more than counterbalances any advantage to be expected from the medicine.

* See what was said on this subject in speaking of the treatment of the phlegmasiæ in general.

Some practitioners affirm that gargles and other washes for the throat should be used cold, while others maintain that they should always be of the same temperature with the body. The observation made when speaking of collyria is applicable here. When the inflammation is slight the gargle may be cold, it is then of little consequence indeed whether it be cold or tepid; when the inflammation is more severe it should be of the same temperature with the body. If we are endeavouring to promote suppuration, its temperature should be higher.

The applications to the internal fauces are sometimes made in the form of vapour. The vapour of warm water employed at an early period tends to procure resolution; at a later period to induce a speedy and favourable suppuration. When the former is our view vinegar may be added to the water. The vapour may be drawn in through the spout of a tea-kettle, or more conveniently and effectually by the instrument termed an inhaler. We have reason to believe that little advantage is derived from impregnating the vapour with the flavour of the flores sambuci and other aromatics recommended by Eller, Licutaud, and other foreign writers.

There is some difference of opinion respecting the employment of sialogogues in this complaint; the advantage often derived from spontaneous salivation has induced some to recommend them, but the irritation they occasion seems generally to counteract any benefit to be expected from the increased flow of saliva. Practitioners therefore seldom employ mere sialogogues in cynanche tonsillaris, but if the means which prove otherwise serviceable excite a flow of saliva, it tends to diminish the inflammation.

According to the mode of arrangement I follow, local blood-letting, when performed from any part of the internal fauces, should be considered here. It will be better however to throw into one place the few remarks to be made on this remedy.

Of the local remedies employed externally in the inflammatory sore throat.

These must be conjoined with the foregoing remedies. The simplest are warm applications and rubefacients. With respect to the composition of the rubefacients; mustard generally employed in other cases is too harsh an application here. Sir John Pringle advises a piece of flannel to be moistened with oil and a solution of the mild volatile alkali, in the proportion which the patient can easily bear, and applied to the throat. By this remedy, he remarks, a sweat is brought out on the neck and sometimes over the whole body. This composition, which has been very generally employed, is much more effectual than bags of hot salt or sand recommended by some, and more agreeable than the

dung of animals, which has actually been often employed for the same purpose.*

If the general excitement be considerable, it is proper to delay the use of rubefacients till it has been reduced by proper evacuations.

The same may be said of the employment of blisters, which are a more powerful remedy in this complaint. They are never proper however at an early period, for if the excitement is not considerable the complaint is mild, and then blisters are too severe a remedy.

When they are employed they should be pretty large and applied as near the fauces as can conveniently be done. A large blister between the shoulders is often serviceable. Although blisters do not at first bring relief, we are not to despair of their proving useful, for when the first fails a second often succeeds, or when the discharge excited at first brings no relief, the continued discharge kept up by the ung. cantharid. frequently succeeds better.

But in this, as in similar cases, there is no local remedy so generally beneficial as local blood-letting. Scarifying the parts affected as far as they can be reached is often recommended. This is particularly serviceable when the swelling is very considerable, but when it is not, there are better means of local blood-letting in this complaint. The ranular veins are sometimes opened, but this, as Dr. Cullen observes, is an insignificant remedy, and as it is at the same time a troublesome one, it is seldom put in practice.

Scarification and cupping on the neck is more effectual. When the neck is much swelled and inflamed, Tissot observes, one or two cuts made pretty deep have often saved the patient's life; leeches however are still the most convenient means of performing local blood-letting.

When a tendency to suppuration has taken place, emollient poultices applied to the external fauces are proper.

Certain operations form part of the local means employed in the cynanche tonsillaris. These belong to the province of the surgeon. The most common is laying open the abscess after it is completely formed, which lessens the duration of the complaint. This, it is evident, can only be done where the seat of the abscess can be brought into view or distinctly felt.

Bronchotomy is a more serious operation, and fortunately less frequently necessary. When the swelling threatens suffocation, however, it ought never to be delayed. Many have laid it down as a rule never to perform this operation when, from a weak and intermitting pulse, and other symptoms of extreme debility, the

* Dr. Sims on Epid. Dis.

patient's death appears inevitable. This advice seems to proceed from too anxious a regard for the practitioner's reputation, which might be injured by the patient's dying after the operation. When it is recollected that in such cases the most alarming symptoms are often the consequence of the impediment opposed to respiration, and will disappear when a free passage is given to the air, we shall see reason for making the attempt even where the state of the patient appears almost desperate. The reader will find Michaelis, in his *Treatise de Angina Polyposa*, and others who were conversant with bronchotomy, speaking of it as a very trivial operation, always to be had recourse to where there is any risk of suffocation.

Such are the various local means employed in the inflammatory sore-throat. In the mildest cases, the simplest of these, any of the common gargles, and external warmth, are sufficient.

But wherever the more powerful local means are necessary, we must at the same time have recourse to general means in order to diminish the excitement, for then fever always attends, and sometimes, we have seen, runs very high.

In such cases every part of the antiphlogistic regimen is necessary, and should be more or less strictly enjoined according to the degree of general excitement. Even where the excitement is not considerable, all kinds of animal food and fermented liquors must be avoided, and the diet should be light and diluent, a large quantity of even the mildest food often increasing the affection of the fauces.

However serviceable dilution may be, the patient should not be forced to drink when the pain of deglutition is considerable. In such cases, where the symptoms are generally considerable, frequent and copious clysters ought never to be omitted. In the one way or the other, dilution should, in all the severer forms of the disease, make a principal part of the treatment. "*Interca larga manu propinantur serum lactis aqua nitrosa aliaque diluentia et demulcentia.*"*

When deglutition is wholly interrupted, the patient must also be nourished by clysters, till by the most active means the inflammation of the fauces is reduced.

The first evacuation affecting the whole system, generally employed in inflammatory sore-throat, is vomiting. Emetics given early, and they should never be omitted where there is any degree of fever, often cut short the complaint, and seldom fail to bring considerable relief. Where there is much fever the effects of emetics may be explained by their tendency to promote perspiration; but it is remarkable, that even where there is no affection of the system, they often, in a way we cannot explain,

* Lieutaud's *Synopsis Prax. Med.*

more effectually relieve the inflammation of the fauces than any local remedy we can employ.

At an advanced period of the disease their exhibition requires more caution, and is always less effectual. If the inflammation runs very high they may do harm. Tissot even asserts, that in such cases they may render the disease mortal. Where however the swelling is considerable, compared with the other symptoms, they are often serviceable even at a late period. Lieutaud says he has seen patients labouring under inflammatory angina snatched from the jaws of death by an emetic.

Emetics indeed are sometimes employed with advantage even after the formation of the abscess. When the abscess is situated in the deeper parts of the pharynx, or in the œsophagus, the surgeon cannot reach it, and then the exhibition of an emetic is the most effectual means to procure the discharge of the matter. If the abscess is ripe, the exertion of vomiting will almost always occasion its bursting. However improbable the success of this practice may appear, the reader will find it attested by most writers on the subject. Not only vomiting, but even coughing or laughing, will frequently occasion its bursting. Tissot says he has seen it occasioned in both of these ways.

Another circumstance which often renders the use of vomiting proper towards the end of the disease, is a collection of irritating matter accumulated in the stomach, in consequence of the patient's having swallowed large quantities of acrid or viscid saliva, which both load the stomach and vitiate its secretions. The matter discharged by the abscess also is frequently swallowed.

Next to vomiting, the general evacuation most frequently employed in cynanche tonsillaris, is catharsis. From the general efficacy of catharsis in inflammatory affections of the head, and from the cynanche tonsillaris sometimes terminating by a spontaneous diarrhœa, physicians were led to rely much on the use of cathartics.

Much catharsis however is seldom beneficial, and in the generality of cases the most judicious practitioners prescribe only a mild saline cathartic, and repeat it several times in the course of the complaint. When the inflammation and general excitement are very considerable, more evacuation by the intestines is proper, and then mercurial cathartics are the best, both because they can be swallowed with much more ease than the saline, and because, as will appear more particularly in treating of some of the other phlegmasiæ, mercury seems possessed of some specific power in cases of local inflammation.

In the worst cases however where either the pain of swallowing is so great that the patient refuses to take any thing by the

mouth, or deglutition is absolutely interrupted, we must have recourse to the frequent exhibition of copious cathartic clysters, interposing such as are merely diluent.

General blood-letting is seldom necessary in this complaint. The affection of the fauces can be more effectually relieved by local blood-letting, unless the excitement be very considerable. When general blood-letting is judged necessary, the blood, as in other inflammations of the head, should be taken from the jugular vein, that the same operation may serve the purpose of both local and general blood-letting.

When delirium or coma supervenes, general blood-letting is the remedy on which we chiefly rely, and it must be repeated till the symptoms yield. With the addition of local means to relieve the affection of the fauces, the complaint must then be treated in precisely the same way as phrenitis.

Diaphoretics are more serviceable in inflammatory sore-throat than in most of the complaints we have been considering. It is often terminated, we have seen, by spontaneous sweating. A sweat forced out by external warmth and heating medicines however is rarely serviceable, and often does harm. Diluting liquors, the ammonia acetata or any other mild diaphoretic, together with avoiding exposure to cold, and as soon as any degree of moisture appears on the skin abstaining from the use of cathartics, are often sufficient to induce a sweat which is generally beneficial.

Although in the phlegmasiæ opium given alone, before the excitement is greatly reduced, generally does harm, combined with ipecacuanha, we shall find, it may with great advantage be given at a much earlier period in many of this order of diseases; we have reason to believe in all of them. But of the effects of this medicine I shall have occasion to speak more particularly hereafter.

The degree of fever which generally attends the severer cases of the cynanche tonsillaris renders the vapour bath applied to the head less proper than in ophthalmia, ear-ach, and tooth-ach.

When the inflammation runs to gangrene we must have recourse to the bark and wine, with caution however, lest by exhibiting them too early we rather increase than diminish the tendency to mortification. The observations made on the treatment of gangrene supervening on ophthalmia are applicable here.

There is a material difference, we shall find, in the treatment as well as prognosis of gangrene supervening on the cynanche tonsillaris, and the cynanche maligna. In the latter, we shall find it arises directly from debility; the most invigorating plan is proper, and often successful. In the former, it is the consequence of excessive general excitement; till this is sufficiently diminished, the invigorating plan will do harm, and when the excite-

ment is sufficiently diminished, it is often too late for any plan to be of much service. When deglutition is interrupted, the bark and wine must be exhibited per anum. Such are the various means employed in the inflammatory sore-throat. It is to be remembered that the practice should be the more vigorous, the more the inflammation extends towards the œsophagus, and most so when the inflammation has its seat there. "*Funestissima est angina, quæ nec in fauci bus nec in cervice quidquam conspicuum exhibet.*"*

As metastasis sometimes happens in the cynanche tonsillaris, in which the inflammation attacks some of the viscera, most frequently the lungs, we must be prepared for this accident, and watch the slightest tendency to it.

It will be proper before leaving this subject to make a few additional observations on the means to be employed after a total interruption of deglutition, the most perplexing, and one of the most alarming accidents in this complaint. The interruption of deglutition may proceed either from swelling of the œsophagus, from schirrus, from swelling of the glands particularly in scrophulous habits, or from spasm.

In the first case the most powerful antiphlogistic, particularly local, remedies can alone be of service. In the last, which frequently occurs unaccompanied with cynanche, but is most apt to supervene while this complaint is present, a great variety of remedies have been recommended; few of which however have been found of much service.

The medicines which seem to have proved most beneficial are emollient and oily applications used externally, and internally if any power of deglutition still remains, and the medicines which have been termed antispasmodics, particularly opium. Van Swieten† recommends a soap composed of oil of turpentine, vegetable alkali, sal ammoniac, and spiritus mindereri, to be applied externally, and also used internally if it can be swallowed. But even where oily and emollient medicines procure some relief, it is seldom permanent.‡

Dr. Johnstone thinks that opium and the extract of cicuta promise more in this case than other medicines. When any power of deglutition remained, he desired the medicine to be swallowed; in other cases the opium and cicuta were made into pills, which the patient was desired to hold in the mouth till they were dissolved and taken up by the lymphatics. The exhibition of

* Quarin de Febris.

† Com. in Aph. Boer. Aph. 797.

‡ See a paper by Dr. Johnstone, in the second vol. of the Memoirs of the Med. Soc. of London.

mercury has been pushed to salivation without bringing relief.* Mechanical force has been employed. This however is always attended with danger, and has even proved fatal, as in a case mentioned by Dr. Johnstone.

When there is reason to believe that deglutition is prevented by a schirrus of the œsophagus, he thinks bougies of a proper size may be employed with safety and often without giving much pain.

When the dysphagia arises from a swelling of the lymphatic glands, the medicines employed in scrophula are often serviceable. In this case the author just mentioned says he has succeeded by means of burned sponge and the flores martiales, which he directs to be held in the mouth if the power of deglutition is wholly lost. Others recommend this mode of exhibition in similar affections of the throat, even where there is no difficulty of swallowing ; and when the complaint is in the lymphatic glands there is reason to believe that it is the most effectual.

When the patient has been weakened by previous disease, or the inflammatory sore-throat itself has been severe, it is necessary for some time after it, to use means for restoring the strength. Nourishing food and wine are generally sufficient for this purpose. Dr. M'Bride and others recommend the bark and steel, which, if any medicines are necessary, are the best.

Those who are subject to frequent attacks of cynanche tonsillaris can only avoid it by avoiding its remote causes, particularly the various causes of plethora and exposure to cold.

As after frequent attacks of the disease the fauces are left in a state of relaxation which is favourable to its return, the use of astringent gargles for sometime after the complaint, is often necessary. Those prepared from the bark and allum appear to be the best. Keeping a piece of allum in the mouth and swallowing the saliva impregnated with it, often proves a good preventive.

SECT. II.

Of the Cynanche Maligna.

This form of cynanche, we have seen, from the definition quoted from Dr. Cullen's synopsis, affects the tonsils and mucous membrane of the fauces with tumor, redness, and mucous crusts of a whitish or ash colour gradually spreading and covering ulcers. The fever which attends it, contrary to what happens in the other phlegmasiæ, partakes more of the typhus than synocha,

* Dr. Johnstone succeeded in one case by means of corrosive sublimate and the bark, but thinks they do not promise to be generally successful.

and it is very frequently attended with an eruption on the skin of the same nature with that of the scarlatina, between which and the cynanche maligna there is so striking an analogy, that when the former is attended with sore-throat and the latter with the eruption, as happens in most cases, they can only be regarded as varieties of the same disease.

However important it may at first view appear to detect a diagnosis between complaints, in many cases of which the treatment is directly opposite, on a closer view it will be found that such a diagnosis, did it exist, would, in the present instance, be altogether useless in practice; for if the symptoms of the two complaints run imperceptibly into each other, the same is true of their modes of treatment; and there is no difficulty in adapting the means we employ to any case, according to the degree in which the one or other set of symptoms prevail.

Without a diagnosis indeed we cannot so readily give a name to every case of the disease; we are constantly meeting with cases where the symptoms of scarlatina and cynanche maligna are so blended that it is difficult to say of which disease they partake most. But this is the amount of the embarrassment; we practise in such cases with as much ease as in either complaint exquisitely formed; so that those who have with so much eagerness been searching after a diagnosis between these complaints, have been searching after little more than a name.

Were we attempting to form a perfect system of nosology, which in the present state of knowledge, perhaps in any state of it, is impossible, the object would be one of importance, but while our aim is merely to form such a system as shall assist us in practice, it is of none.

It is a dispute of as little consequence whether the cynanche maligna and scarlatina should be regarded as different diseases, or only different degrees of the same disease. If by different diseases we mean those whose symptoms differ, they are surely very different; if by different diseases we mean those whose causes are different and which never run into each other, they must be regarded as varieties of the same disease.

Some have regarded the scarlatina and cynanche maligna as three, not two, different complaints, namely, that in which the skin, and not the throat, is affected; that in which the throat, and not the skin, is affected; and that in which both are affected. Respecting this division, it is only necessary to observe, that it is neither useful in practice nor accurate in a nosological point of view. If we aim at nosological accuracy, the last of the three complaints can have no place; for if the two former be admitted, this can be regarded in no other light but as a combination of them.

This is perhaps the most accurate view of the subject, accord-

ing to which the scarlatina simplex alone should have been ranked among the exanthemata ; and the pure cynanche maligna, namely, that unattended by an affection of the skin, considered a distinct complaint. It would then have been easy to describe the appearances resulting from the combination of the two diseases, and the manner in which the treatment should be adapted to different cases, according as the symptoms of the one or the other prevail.

As the scarlatina and cynanche maligna strictly so called often appear unattended by each other, in a system of nosology they should be regarded as distinct diseases ; as they are so frequently combined, their combinations must be treated of in a system of practice. Such appears to be the most accurate view of these diseases. I have not chosen however to depart so far from the manner in which they are considered by others.

1. Of the Symptoms of the Cynanche Maligna.

The symptoms of this complaint are so complicated, that it is difficult to give a view of them at the same time sufficiently full and distinct.

We shall in the first place consider the manner in which the disease makes its attack. 2. The symptoms arising from the affection of the fauces. 3. The other symptoms which attend this affection. 4. The various appearances of the eruption. It will then be proper to make a few observations on the different terminations of the disease ; and lastly, we shall compare the symptoms of the cynanche maligna and scarlatina cynanchica in the same manner as those of the latter were compared with the symptoms of the scarlatina simplex.

The attack of cynanche maligna often differs but little from that of simple fever. The patient complains of lassitude, dejection of spirits, pain, and giddiness of the head. He is generally affected with more or less cold shivering, frequently alternating with fits of heat. He soon becomes thirsty and restless, the pulse is frequent, and the breathing more or less hurried.

These symptoms seldom continue long before the patient complains of a sense of stiffness about the neck, with some pain and difficulty of swallowing, and on inspecting the fauces, they appear red and swelled. In many cases the affection of the fauces is troublesome from the beginning, and is sometimes the first symptom.

When the disease makes its attack in this way, the prognosis is favourable, it is probable that the affection of the fauces will not be alarming, and that the complaint will partake considerably of the nature of the scarlatina.

But when along with the foregoing symptoms the patient com-

plaints of severe head-ach, especially a pain in the crown of the head, violent pains of the back and limbs, or pain in the stomach, with nausea and vomiting or with diarrhœa ;* when instead of slight giddiness of the head, he is affected with coma or delirium ; when the eyes are heavy and watry, the countenance either full and bloated, or pale, shrunk, and dejected ; when the patient complains of an unusual sense of oppression and debility ; when the pulse is small, irregular or tremulous, whether frequent or not, (Quarin† observes, that the pulse is sometimes less frequent than natural at the commencement of cynanche maligna) or full, heavy undose, and unequal, as Huxham‡ expresses it ; when the breathing is small, hurried, anxious, and interrupted with sighing ; when the urine is quite limpid, or very high coloured and turbid ; when the sensation in the fauces is rather that of an uneasy stiffness than of pain, the deglutition being little impeded ;|| when the internal fauces appear of a dark red with brown spots, the tongue, especially towards the root, being loaded with much viscid white mucus ; when an eruption of small red pustules or purplish blotches appear on the skin soon after the commencement, or at the very commencement, for in the worst cases of cynanche maligna the eruption has been known to be among the first symptoms, the prognosis is bad.

It is not meant that all the foregoing symptoms shew themselves at the commencement even of the worst cases. It is sufficient, if several of these appear, to denote the malignity of the disease.

The very worst cases of cynanche maligna however sometimes make their attack in so deceitful a way, that for some time, the symptoms differ little or not at all from those of the most favourable cases, so that although the one set of symptoms always affords an unfavourable, the other does not uniformly afford a favourable prognosis. In some cases the symptoms remain very mild for several days. Mr. Colden§ says, children often drooped, and if they had sores or issues, the matter began to look ill several days before they were considered as labouring under the complaint. Huxham makes nearly the same observation.

* The diarrhœa is often bilious. Both the vomiting and diarrhœa are most frequent in children. Although nausea and vomiting are among the worst symptoms of this complaint, yet it often proves fatal when they have not appeared. Mr. Colden says they rarely occurred in the epidemic he saw. See Mr. Colden's letter to Dr. Fothergill, in the first volume of the Medical Obs. and Inq.

† De Febribus.

‡ On the Malignant Ulcerous Sore-throat.

|| The pain and difficulty of swallowing, Dr. Wall observes, is sometimes so trifling, that the complaint often makes great progress without the patient knowing that there is any disorder in the throat. He relates a case in which this happened.

§ Med. Obs. and Inq. vol. i.

The strength in particular is often not much impaired at an early period, nor always indeed in the progress of the complaint. Even in the worst cases, Mr. Colden observes, many walked about till within an hour or two of their death.

It has sometimes happened, as in an epidemic described by Mr. Stephen,† that the temperature of the body was hardly greater than natural, not only at the commencement, but throughout the whole complaint.

The absence of all the symptoms of fever indeed at an early period, by no means assures us that the case is free from danger. Mr. Collins† observes, that in the malignant sore-throat epidemic in St. Vincent, the fever did not usually appear till the affection of the throat had lasted seven or eight days, and the patient generally walked about, notwithstanding a very bad state of the throat, till the fever came on.

It is even asserted by some that the cynanche maligna has appeared without being accompanied by fever at any period. Mr. Short in his Chronological History of the Weather, observes, that this was the case in the malignant sore-throat which raged in England in 1742.

On the state of the throat depends the prognosis at every period of the disease. At first, we have seen, the patient complains of a stiffness of the muscles of the neck, and some difficulty in deglutition.‡ As the affection of the fauces increases, it is often attended with some degree of hoarseness, which, like the difficulty of deglutition, however is seldom considerable.

If the breathing be much affected, it proceeds from the inflammation spreading to the trachea, which sometimes happens, giving rise to a combination of this species of cynanche, and the next we are to consider the cynanche trachealis. The latter however does not, we shall find, when arising from the cynanche maligna, assume precisely the same appearance as when an idiopathic complaint. Some of the symptoms denoting an affection of the trachea in cynanche maligna do not appear in cynanche trachealis.

However florid and free from specks the fauces may appear at the commencement of the cynanche maligna, they soon assume a dark red, and specks of some shade between a light ash colour and a dark brown appear scattered over the tonsils, velum pendulum palati, and uvula. The lighter the colour of the specks, the better is the prognosis.

* Med. Comment. vol. xii.

† Med. Comment. vol. ii

‡ As in cynanche tonsillaris, the œsophagus is sometimes but rarely affected with spasm, rendering the deglutition very difficult or wholly interrupting it.

The first appearance which the internal fauces assume in this complaint, is sometimes that of a large whitish coloured stain surrounded with a florid margin, the stain soon becoming a large slough.

The swelling is sometimes considerable, but seldom so much so as in the cynanche tonsillaris. In the appearance of the throat indeed, as well as the other symptoms, the cynanche maligna frequently at an early period so nearly resembles the inflammatory sore-throat, that they can only be distinguished by the nature of the causes from which they arise, and that of the prevailing epidemic.*

As the sloughs spread, they generally become of a darker colour, the interstices at the same time assuming a purple hue, new specks appear, and the whole internal fauces are at length covered with thick sloughs, which frequently fall off, discovering ulcers sometimes very deeply seated.

When the sores left after the separation of the sloughs, appear of a fiery red, the danger, Mr. Colden observes, is very great. When they become covered with a black crust, the event is generally fatal. When, on the other hand, as Huxham remarks, the parts which the sloughs covered appear florid and clean, the prognosis is favourable.

As the disease advances, the breath becomes very fetid and is often disagreeable to the patient himself. He generally spits out much mucus tinged with blood, and often a matter of a livid sanguinous appearance, which is sometimes so corrosive that it excoriates every part it touches. The lips are often of a livid or black colour, and on their inner sides, covered with small vesicles containing an acrid ichorous matter. The sudden suppression of the discharge from the throat has been observed, especially in children, to be followed by a very dreadful train of symptoms, which often suddenly prove fatal.

In the worst cases, the fauces at length appear quite black, mortification having taken place, and pieces of mortified flesh fall off from them, and are spit out. It is needless to say that this symptom affords a very unfavourable prognosis; it is not always fatal however, some recover even from this state of the fauces, as I have myself witnessed.

When the complaint takes a favourable turn, the parts surrounding the sloughs begin to assume a more florid appearance, and a better conditioned matter begins to be discharged from the ulcers.

While the affection of the fauces increases the various symptoms of general derangement keep pace with it. If neither de-

* See the diagnosis between these complaints, in the 211th page of Dr. Fothergill's works published by Dr. Lettsom.

lirium nor coma appeared at an early period, when the affection of the throat is considerable, they generally come on in the progress of the complaint. The eyes become more fixed, dull, and heavy; the delirium being for the most part of that kind which attends typhus. Dr. Fothergill has observed, that the delirium in cynanche maligna is of a peculiar kind; an observation which has not been confirmed by the experience of others.

In some cases the delirium is of the phrenitic kind. There is then reason to believe that the inflammation has spread to the brain; an accident which generally proves fatal. The countenance is then flushed and assumes an expression of fierceness. In the generality of cases it is swelled and bloated, sometimes so much swelled, Mr. Russell* observes, as to close the eyes, or shrunk and cadaverous.

Early in the disease there is a strong expression of anxiety in the countenance, which wears off as the debility increases. At a more advanced period the eyes are generally affected with a languid inflammation, in the worst cases often suffused with blood, which is a very fatal symptom.

All kinds of hemorrhagics are unfavourable in the exquisitely formed cynanche maligna. The observations made on this symptom in simple typhus are applicable here.

Petechiæ do not so frequently attend cynanche maligna, as the other symptoms would lead us to expect. In some epidemics they are more frequent than in others: Dr. Wall and a few other writers speak of them as not an unusual symptom. In an epidemic mentioned by Mr. Short, they seem to have appeared in almost every case.

As the disease advances, the pulse becomes more depressed. On touching the skin, which is generally parched, the same sensation of heat is experienced as in malignant typhus.

Throughout the greater part of the complaint, there is generally an exacerbation in the evening, during which the breathing often becomes rattling or even sterterous.

The diarrhœa increases in the progress of the complaint, or supervenes if it did not appear at the commencement, the patient complains of griping pains, and the matter discharged is often so acrid that it excoriates the anus and neighbouring parts. When the fæces become black, the prognosis is very bad.

The supervening or increase of the diarrhœa in the progress of the complaint seems often, Dr. Huxham observes, to proceed from the acrid matter of the fauces getting into the stomach and intestines, or from the sloughy affection of the fauces spreading to these parts, for in some cases it has been traced along the

* Economy of Nature in Acute and Chronic Diseases.

whole course of the alimentary canal,* and the hemorrhagies which succeed the abrasion of the sloughs in the intestines are often very considerable.

It was observed above, that the inflammation in some cases spreads to the larynx and trachea. The same is true of the ulcers; they have been traced by dissection even beyond the division of the trachea. As soon as the complaint attacks the wind-pipe, a very troublesome set of symptoms supervenes; the voice is altered, assuming a wheezing or ringing sound, sometimes it is lost, the breathing becomes difficult, and is now and then wholly interrupted so that the patient is suffocated. He is teased with a severe cough endeavouring to bring up the acrid matter secreted by the ulcers, which resembles that spit out from the fauces; it is sometimes mixed with small tubiform substances, once supposed to be portions of the internal membrane of the trachea and bronchiæ, but now known from dissection to be a matter formed by the disease, which lines these canals, and which we shall have occasion to consider more particularly in treating of the cynanche trachealis.

The tendency of the cynanche maligna to affect the trachea, has induced Dr. Johnstone to propose dividing the complaint into the cynanche maligna tonsillaris, and trachealis.

In the more severe cases indeed almost every part in the neighbourhood partakes more or less of the affection of the fauces; the membrane lining the nostrils is generally much affected, an acrid matter often mixed with blood running from it, which excoriates the lips or any other part it falls upon; it sometimes even raises blisters on the hands or arms of children, when they employ them for wiping it away from the lips. The irritation of this matter in the nostrils often occasions frequent sneezing.

Unfavourable as such a discharge always is, its sudden interruption is still more to be dreaded. Huxham says, that the ceasing of this discharge "choaked several." This symptom is seldom so considerable in adults as in children.

The inflammation, as in the cynanche tonsillaris, sometimes spreads along the eustachian tube to the internal ear, occasioning ulceration, and sometimes wholly destroying its structure. Mr. Colden makes the following curious observation, that some had sores, like those on the throat, behind the ears, on the genitals, or other parts of the body, and in these cases there was sometimes no ulceration or even affection of the throat.

The inflammation often spreads to the parotid, maxillary, and other glands in the neighbourhood of the fauces, which become swelled and painful. Huxham says, that he has seen this hap-

* See Mr. Russell on the Economy of Nature in Acute and Chronic Diseases, Huxham on the Ulcerous Sore-Throat, &c.

pen at the very commencement of the disease, and even threaten suffocation.

The whole neck indeed sometimes becomes swelled and of a dark red colour. Even the arms, hands, and fingers, in some cases, become inflamed, swelled, stiff, and painful.

When the trachea is much affected, particularly if the disease spread beyond its division into the bronchiæ, an inflammation of the lungs often comes on and proves fatal. Pneumonia indeed sometimes supervenes in the cynanche maligna, without being preceded by any affection of the trachea, and has even suddenly destroyed the patient where there had been no alarming symptom, as happened in some cases under the care of Mr. Col-den.* “Sometimes,” he observes, “they died very suddenly “when their situation had not appeared alarming, and on dissection the lungs were generally found inflamed.” Mr. Collinst† also observes, that the cynanche maligna sometimes proved fatal after the affection of the fauces had wholly disappeared, the inflammation having spread to the stomach or lungs. Hiccup, which, particularly at the height of the disease, has been observed to be a very unfavourable symptom, probably arises from the inflammation spreading to the œsophagus and stomach.

The cynanche maligna generally arrives at its height about the fifth or sixth day, and in cases which terminate favourably declines in five or six days. It has been observed, that it runs its course, that is, comes to its height and declines, more slowly in adults than in children.

Such are the symptoms attendant on the worst state of the fauces in the cynanche maligna. When the disease takes a favourable turn, when the florid colour begins to return to the fauces and a better matter to be discharged from the ulcers, all the symptoms which have just been enumerated are either absent or considerably modified. The countenance begins to lose that peculiar expression, so characteristic of the worst forms of the disease. The pulse becomes stronger and less frequent. The respiration freer. The skin from being parched becomes soft and often moist, which is one of the most favourable symptoms of the complaint.

The evening exacerbations are less remarkable. The discharge from the intestines and that from the nares, if they still continue, are less acrid. In short, the various symptoms indicating danger disappear, or assume a milder form.

But whether the disease proves favourable or otherwise, a set

* Med. Obs. and Inq. vol. i.

† Med. Comment. vol. ii.

of symptoms which still remain to be considered, generally attends.

The connection between the cynanche maligna and scarlatina, I have already had occasion to notice. It sometimes happens, we have seen, that the former, such as it has just been described, appears without any affection of the skin, in the same manner as we sometimes meet with the scarlatina without any affection of the throat; in general however the affections of the throat and skin are combined, and seem wonderfully influenced by the state of each other. But while the absence of the sore-throat in the scarlatina always affords a favourable prognosis, that of the eruption in the cynanche maligna generally affords an unfavourable one.

In some epidemics, the generality of cases have appeared without any affection of the skin. Lieutaud even speaks of the eruption as a rare occurrence in cynanche maligna. "*Ut sileamus de efflorescentiis cutaneis aliisque variis symptomatibus.*"* Dr. Wall also observes of an epidemic cynanche maligna, that very few had the scarlet eruption. There are instances of epidemics indeed, as that described by Dr. Collins, in which the eruption did not appear in a single instance.

The period at which the eruption shews itself is various; it is rarely later than the fourth day, and seldom so early as the first. The early appearance of the eruption is unfavourable. It generally first shews itself about the neck and breast, sometimes with such itching that the patient tears the skin. In general, however, there is little or no itching.†

The eruption, often attended with some swelling, gradually spreads over the trunk and extremities. As in the scarlatina, it comes out in stains which, when nearly inspected, appear composed of small prominent pustules. Their prominence may sometimes be distinguished by the eye, more frequently by the touch only.

There are sometimes pustules of a larger size, particularly on the extremities, which are readily seen, being of a more intense red than the parts which surround them.

The appearances of the eruption affording a favourable prognosis, are the same as in the scarlatina, a florid colour, uniform diffusion over every part of the body, and a copious desquamation.

The eruption, however, is sometimes considerable where the prognosis is bad. Huxham says, he has seen some in this com-

* Synopsis Prax. Med.

† In some cases, Huxham observes, there is itching and desquamation without any eruption.

plaint die of a phrensy who were covered with "the most fiery rash" he ever saw.

It is rarely, however, that the eruption is uniformly diffused in the cynanche maligna; it generally comes out in blotches or small points scattered over the trunk and extremities, which are seldom of a florid red, but of a dark purplish or livid hue, and which terminate in but a very scanty desquamation.

When the eruption is favourable, a remission often takes place on its appearance, and almost always at the period of desquamation. When it is unfavourable, its appearance never, and its termination rarely, brings relief.

The duration of the eruption, like that of the complaint previous to its appearance, is seldom less than one day, and seldom more than four. In some cases it disappears and returns again, which is far from being favourable.

As in other eruptive fevers, the eruption in cynanche maligna has sometimes suddenly receded, an alarming train of symptoms supervening.* The patient falls into dropsical swellings, the countenance assumes a cadaverous appearance, and convulsions supervene, which frequently terminate in death. A similar train of symptoms has supervened on the eruption suddenly assuming a livid appearance, or becoming pale from being very high coloured.

We have reason to believe that here, as in other similar cases, a debilitated state of the system is the common cause of the changes which take place in the eruption, and the symptoms which attend these changes.

The desquamation often continues a long time after every other symptom is gone. It is not uncommon to see patients peeling the cuticle from their fingers, after they have been well for a fortnight or three weeks.

In the cases which terminate favourably, the symptoms often gradually abate without the appearance of any which can be regarded as critical; in most favourable cases, however, a gentle sweat appears about the time of desquamation. This crisis has been observed to be less perfect in adults than in children.

The sweat sometimes appears earlier than this period; it then brings relief, but seldom wholly removes the fever. "General sweats," Huxham remarks, "on the third, fourth, or fifth day, or later, were salutary." Dr. Fothergill observes, that the morning sweats, when they occurred early in the disease, often brought such temporary relief to the febrile symptoms, that the complaint assumed the intermitting form.

* See Mr. Russel's work on the Economy of Nature in Acute and Chronic Diseases of the Glands, and others on the Cynanche Maligna.

A moisture sometimes appears on the skin in the mornings, however, without bringing any relief, which seems merely the consequence of debility, and indicates danger. The cynanche maligna, like most other febrile diseases, often abates with a copious sediment in the urine.

The other symptoms frequently critical in continued fever,* seldom prove so in cynanche maligna. As in all other febrile diseases, certain accidental symptoms are occasionally attended with relief. Thus, Mr. Russell says, a swelling of the tonsils was sometimes critical.

With regard to the unfavourable terminations of this complaint, some I have already had occasion to mention; the patient, we have seen, is sometimes destroyed by the inflammation spreading to the stomach or lungs, or attacking the brain, so that he dies with the symptoms of gastritis, pneumonia, or phrenitis. As we might, *a priori*, suppose, visceral inflammation supervening on so debilitated a state of the body generally proves fatal.

A retrocession of the eruption, and ceasing of the discharge from the fauces, have also been mentioned as sometimes attending the fatal termination. The discharge from the fauces is most apt to be diminished during sleep.

Some die of profuse hemorrhagy from the intestines, nose, mouth, or ears. The menstrual discharge frequently appears before the usual period in the cynanche maligna, and sometimes becomes profuse. Many in this complaint have had it for the first time. If copious, or before the proper period, it is generally an unfavourable symptom; if very profuse, it may prove fatal.

Some die suddenly by suffocation, sometimes in consequence of the swelling of the glands of the neck, more frequently, of the complaint having spread to the trachea.

Others are gradually reduced by a catharsis of acrid matter, which, notwithstanding every means we can employ, often continues for some weeks.

When the trachea and its branches have been much affected, ulcerations are sometimes formed in the lungs, and hectic fever soon makes its appearance. I shall not here enter into the question whether the cynanche maligna gives rise to phthisis, except where tubercles have previously existed in the lungs; it is certain that it has occasioned phthisis where there had not previously been any symptom shewing a tendency to this complaint.

In many cases the fatal, like the favourable termination is unattended by any peculiar symptoms. The worst of the symptoms which have been enumerated gradually supervene. The

* See the observations on the crises of fevers, in first vol. of this work.

fauces become black; if the eruption be present, it assumes a dark purple colour; even where there is no eruption on other parts, the swelling and purple colour of the throat often supervene, the breathing becomes difficult and sonorous, and is frequently interrupted for some seconds. A degree of stupor comes on, the eyes appear glossy, the faces become very fætid, and are passed involuntarily. In these circumstances, hiccup, one of the most fatal symptoms if it appear while the others are alarming, frequently comes on; the extremities become cold, and are covered with a clammy sweat. The pulse intermits, at length it cannot be felt, and the patient gradually expires, or is carried off by convulsions.

After the foregoing train of symptoms has supervened, nobody recovers; but let the state of the fauces and other symptoms be what it may, if the pulse be pretty steady and the strength not greatly exhausted, we are not to despair. The prognosis is very bad, but by the vigorous use of proper means the patient may be saved.

The prognosis in all cases of cynanche maligna will be best determined by observing how far the symptoms incline to those of scarlatina. In treating of the scarlatina the symptoms of this disease in its mildest form were compared with those indicating a tendency to cynanche maligna; we are now to compare the symptoms of the exquisitely formed cynanche maligna with those indicating a tendency to scarlatina.

In the scarlatina the first symptoms are those common to most fevers, particularly the varieties of synocha. The face is flushed, the pulse full and frequent, and the patient complains of languor with chills and cold shivering.

If these be the only symptoms at the commencement of the cynanche maligna, they are generally more severe than in the scarlatina. In most cases of cynanche maligna however the patient complains of acute pains in the back and limbs, he is attacked with nausea and vomiting, or diarrhœa, or with both. In the worst cases the pulse from the first is often weak and tremulous; the loss of strength for the most part is great and sudden; the extreme anxiety which generally attends this complaint is strongly marked in the countenance; and even delirium or coma supervenes on the first night.

In the scarlatina the eyes are inflamed and prominent. In the cynanche maligna they are often more or less inflamed also, but heavy, watry, and in the progress of the complaint, fixed and glossy.

When the eruption is florid and uniformly diffused, there is generally from the beginning considerable pain of the throat increased on swallowing, the fauces appear of a florid colour and

considerably swelled, and if spotted, the spots are of a light colour. In the true cynanche maligna the patient complains of little pain, but rather of an uneasy stiffness about the neck ; the fauces appear of a dark red or purple, and are covered with crusts of an ash or darker colour. In this respect however there is much variety. In some cases of cynanche maligna the fauces at the commencement appear of a florid red, and now and then redder in some places than in others.

In the progress of the scarlatina the specks which appear on the fauces are not readily changed into ulcers, and never spread so as to cover the whole or greater part of the fauces, nor erode the subjacent parts ; those parts which are not covered with the specks remain of a florid colour, and if there is an unusual excretion from the fauces it is only that of thin or viscid mucus or saliva. The contrary of all this is true of the cynanche maligna, the specks soon degenerate into ulcers, which spread rapidly to the adjacent parts, eroding those which lie beneath them. The whole fauces often assume a black colour, mucus mixed with blood, a livid sanies or even pieces of mortified flesh are spit out, and the fœtor of the breath is intolerable.

In the scarlatina there is no acrid discharge from the nostrils or intestines ; in the cynanche maligna the discharge from both is often so acrid as to excoriate every part it touches.

The various hemorrhagies producing bloody saliva, bloody urine and stools, and a bloody suffusion of the eyes, are symptoms of the cynanche maligna never met with in scarlatina.

In the progress of scarlatina the face is generally red and somewhat swelled ; in the cynanche maligna it is pale, swelled, and bloated, or shrunk and cadaverous.

In the scarlatina the mental functions are rarely deranged. In the cynanche maligna, if delirium or coma do not appear at the commencement, they seldom fail to supervene in the progress.

Various symptoms above enumerated, which never appear in scarlatina, often attend the cynanche maligna from the affection of the fauces spreading along the œsophagus to the stomach, or even along the whole tract of the intestines, and from its spreading to the trachea and larger branches of the bronchiæ*

All the parts in the neighbourhood of the fauces, the eustachian tube, the internal ear, the parotid, maxillary, and other glands of the neck, more frequently partake of the affection of the throat in the cynanche maligna than in the scarlatina. In the cynanche maligna, the period at which the eruption shews itself

* All those parts to which we have seen that the affection of the fauces in cynanche maligna spreads, are often found on dissection in the same gangrenous state with the throat.

is uncertain ; we have seen that it sometimes comes out even on the first day : in the scarlatina it generally makes its appearance on the third or fourth day.

In the latter it is of a florid colour, and soon spreads uniformly over the whole or a great part of the body. In the former it often appears in blotches or points, either not very discernible, or of a purplish hue.

In the scarlatina the appearance of the eruption often brings relief, particularly to the sickness and anxiety if they be considerable ; it terminates in a copious desquamation of the cuticle, and if its appearance failed to bring relief, its termination seldom does. In the cynanche maligna it terminates in but a very partial desquamation, which, like the appearance of the eruption, rarely brings relief.

In the scarlatina the eruption for the most part is steady, gradually assuming a brownish hue, which precedes the desquamation. In the cynanche maligna it is often inconstant, disappearing and again coming out several times in the course of the complaint.

It is in the cynanche maligna that a retrocession of the eruption, and the symptoms which accompany it, are most apt to occur.

Phrensy or pleurisy never supervene in the scarlatina, nor is it liable to be followed by phthisis.

A gentle sweat, which only sometimes appears at the time of desquamation in the cynanche maligna, and seldom proves critical, very generally accompanies the same period in scarlatina, and is almost constantly attended with an abatement of the symptoms.

It may not be useless to subjoin to what has been said, a short parallel of the symptoms of the scarlatina and cynanche maligna, given by Dr. Withering. Some parts of Dr. Withering's observations are less applicable to these complaints as they generally appear, than to the particular epidemics which fell under his observation, as the reader will perceive on comparing them with what has been said.

“ In the scarlatina,” he observes,* “ the skin is full of scarlet, smooth ; if pimply, the pimples are white at the top, always dry and hot. In the cynanche maligna the skin is red tinged, pimply, the pimples redder than the interstices, bedewed with sweat towards the morning.

“ In the scarlatina the blood is buffy and firm ; in the cynanche maligna, florid and tender.

“ In the scarlatina the eyes are shining, equable, intensely red,

* In Dr. Withering's Treatise this parallel is expressed in a table.

“rarely watry ; in the cynanche maligna they are inflamed and watry, or sunk and dead.

“In the scarlatina in summer the tonsils and parts in their neighbourhood are little tumified and without sloughs ; in autumn they are more swelled and the sloughs white. In the cynanche maligna the tonsils and parts in their neighbourhood are considerably swelled and ulcerated, and the sloughs are ash-coloured or dark-brown or black.

“In the the scarlatina the breath is very hot but not fœtid ; in the cynanche maligna it is offensive both to the patient himself and his attendants.

“In the scarlatina in summer the voice is natural, in cynanche maligna flat and rattling.*

“In the former there is no purging at the accession, in the latter there is.

“The scarlatina terminates on the third, fifth, eighth, or eleventh day ; the cynanche maligna at no stated period.

“Lastly, the nature of the scarlatina is inflammatory, that of the cynanche maligna is putrid.”

With regard to the diagnosis of cynanche maligna, it is needless to make any addition to what has already been said.

Such are the symptoms of the cynanche maligna, and the means of collecting the prognosis in this complaint. Death may happen at any period ; it has often happened even on the first day. Dr. Fothergill observes, that in the greater number of cases which terminated fatally under his care, the patient died before the fourth day. Those, he observes, who survived the fourteenth, were thought to be out of danger, at least from the disease itself, though some dropped off unexpectedly after a much longer reprieve ; for the patient sometimes recovers from the disease, and falls a sacrifice to its consequences, dropsy or other diseases of debility.

When the voice is much impaired, it sometimes does not recover its tone for many months or even years. It has been remarked that the effects of this disease continue longest in those of a phlegmatic habit. In them indeed ulcerations of all kinds are generally less acute, but more obstinate than in others. “With regard to constitution,” says Dr. Fothergill, “it may be observed that in soft lax leuco-phlegmatic habits and languid inactive dispositions, every thing else being equal, the disease seems to proceed more slowly, to go off more irregularly, and

* The affection of the voice in cynanche maligna is most remarkable when the trachea is affected. See what was said on this part of the subject.

“leave behind it more lasting effects. In some persons of the
 “temperament just described, though the fever has grown less,
 “and all the symptoms abated in four or five days, yet the
 “sloughs in the throat have continued almost a week after ;
 “whilst in the opposite constitution. though the disease has been
 “much more acute, yet the symptoms have no sooner abated
 “than the sloughs have cast off and the ulcers healed of their
 “own accord.”

2. Of the Causes of the Cynanche Maligna.

The cynanche maligna is one of the few phlegmasiæ which are produced by a specific contagion. The proofs of its arising from contagion, and not from the causes of the other phlegmasiæ, are so generally known, that it is needless to insist upon them.

It is very generally allowed, that at one time the cynanche maligna was known in no part of Europe. Huxham, Mr. Russel,* Lieutaud, and others, maintain that it was known to some of the ancients. Lieutaud says, that Aretæus was the first who gave any account of it. It is the opinion of most writers. however, that the cynanche maligna was wholly unknown to the ancients, and that the complaint mentioned by Aretæus under the name *Ulcera Syriaca* was of a different nature from the malignant sore-throat. The dispute is of too little importance to induce us to enter minutely into its merits.

Dr. Fothergill† was at some pains to trace the rise and progress of the cynanche maligna in Europe in modern times. It appeared first in Spain about the year 1610 ; and spread thence to Malta, Sicily, Otranto, Apulia, Calabria, and Campagna, in the space of a few years. It broke out at Naples in 1618, and continued to rage in different parts of that kingdom for no less than twenty years.

Ludovicus Mercatus, physician to Philip II, and III, kings of Spain, published a treatise on the cynanche maligna, in the fifth volume of his works in 1612. Andreas Sgambatus, a physician of Naples, wrote a treatise on it in 1620. Baptista Cortesius described the cynanche maligna about the year 1625. Eleven years after, Oetius Cletius of Signia published a treatise *De Morbo Strangulatorio*, the name which he gives the cynanche maligna. In 1643 Aurelius Severinus, professor of anatomy and surgery, and physician to the hospital of incurables at Naples, published a dissertation on the same complaint. Petrus Michael de Heredia, physician to Philip IV. of Spain, also wrote on the cynanche ma-

* Mr. Russel, in his *Economy of Nature in Acute and Chronic Diseases*, quotes several passages from Hippocrates, in which he thinks this complaint is mentioned.

† See the beginning of his Paper, entitled, *Of the Sore-Throat attended with Ulcers*.

ligna ; Dr. Fothergill has not been able to discover the precise date of his work. Thomas Bartholine published a treatise on it in 1646.

After the time of these authors, the cynanche maligna seems to have disappeared for many years. The first accurate accounts we have of it after this period were published near our own times.

Dr. Fothergill does not consider the affections of the throat described by Wierus, Forestus, and Ramazzini, as the true cynanche maligna, nor does he esteem as such the scarlet fever and sore-throat which raged at Edinburgh in 1734, an account of which the reader will find in the third volume of the Medical Essays.

There is a complaint which resembles it, shortly described by Tournefort, in his Voyage to the Levant ; he calls it a carbuncle or plague-sore at the bottom of the throat, attended with much fever ; but his account of the complaint is so imperfect, that Dr. Rutty and some others think it bears a stronger resemblance to the cynanche trachealis.

Dr. Fothergill seems to have overlooked Morton's account of a scarlet fever which raged in London towards the end of the 17th century, and was very different from the mild form of this disease described by Sydenham. "*Cæteraque*," Morton observes of this complaint, "*anginæ et peripneumonix symptomata sæpius ingravescent*." What he says in the next sentence is very characteristic of the cynanche maligna. After the eruption he remarks, the complaint often changes to a malignant form, and then it is highly dangerous ; cough, phthisis, ophthalmia, obstinate and colliquative diarrhœa, strumous affections, cachexy, leucophlegmatia, and ascites, often supervene.

Notwithstanding the frequent occurrence of cynanche maligna in our days, few of the circumstances which predispose to it are ascertained. Adults are less subject to it than children, and when they are attacked with it generally have it in a milder form. Dr. Fothergill says he never knew an adult attacked with the cynanche maligna while in health and vigour, in whom it proved fatal.

It has also been maintained, as of the scarlatina, that women are more subject to it than men, and girls than boys ; the accuracy of this observation however is at least doubtful.

Those of a weak and lax habit of body appear to be more subject to it than the robust and firm. "If adults," says the author just mentioned, "are seized with the cynanche maligna, they are commonly such as have been very much conversant with the sick, or else are weak and infirm ; and it seems to affect

“those adults in the severest manner who have been previously “indisposed, or whose strength has been reduced by unreasonable “or immoderate evacuations.” This circumstance Dr. Fothergill regards as assisting to form the diagnosis between the cynanche maligna and the cynanche tonsillaris, which most frequently attacks the healthy and vigorous, and in them runs highest.

Autumn and the beginning of winter are the seasons at which the cynanche maligna most frequently rages; it sometimes however prevails without interruption for several years.

The reader will find the state of the weather in the summers preceding the appearance of this complaint particularly noticed by writers. It would appear however that, if we except an unusual degree of warmth and moisture, there is no state of the weather, which we can detect, that particularly predisposes to it.

The circumstances which tend to increase its virulence are the same with those which increase the virulence of common typhus, warm and moist weather, a sickly habit of body, putrid effluvia, particularly those arising from a number of people being crowded together, especially a number of those labouring under the disease, and every other cause of irritation, whether making its first impression on the mind or body.

It has been observed that the cynanche maligna, like the plague, and indeed most other epidemical diseases, is most fatal on its first appearance, gradually becoming milder, till towards the end of the epidemic it is scarcely attended with any danger.

It has also been frequently observed of this, as of most other epidemics, that other complaints seldom prevail much while it rages, and that those which do appear partake of its nature. The reader will find it observed by Huxham,* Rush,† and others, that while the cynanche maligna raged, sore throats of all kinds, in different cases, approaching more or less to the nature of this complaint, were more frequent than other diseases; and the former farther observes, that there was a surprising tendency to eruptions on the skin, and to aphthæ in all kinds of fevers.

3. Of the Treatment in Cynanche Maligna.

The treatment admits of the same division with the symptoms of cynanche maligna, into general and local. To avoid interruption, I shall defer till after these have been laid before the reader, the few observations to be made on the treatment of certain troublesome symptoms, obstinate vomiting, diarrhœa, &c. which frequently attend this complaint, but are not essential to it. We are in the first place then to consider the local treatment in cynanche maligna.

* Huxham on the Ulcerous Sore-throat.

† Med. Obs. and Inq. by Dr. Rush.

As there are no cases of this diseases in which local remedies alone are sufficient, there is not here the same reason for considering the local, before the general treatment, as in the cynanche tonsillaris. The local, however, is always the simplest part of the treatment, and it will assist the memory to pursue the same mode of arrangement in laying down the treatment of the different species of cynanche.

Of the Local Remedies used internally.

Those most generally employed are gargles. Many of those mentioned in treating of the cynanche tonsillaris are used here. But the articles which have been termed antiseptic, and the more acrid applications, are most successful in cynanche maligna.

The early writers on this disease, above-mentioned, employed many articles in the composition of their gargles. some of the most active of which only have been retained in modern practice.

During the first stage of the disease they recommended various articles, which have been termed repellents, mild acetous liquors, a decoction of barley with vinegar, the juice of the pomegranate or mulberry, &c. When white sloughs appeared, they prescribed a decoction of lupins. vetches, &c. with honey of roses; when the throat was ulcerated, myrrh or allum mixed with honey of roses, the unguentum egyptiacum in barley-water, the green and blue vitriol, or the diluted sulphuric or muriatic acids. Even arsenic and the actual cautery were occasionally recommended.

As soon as the symptoms were mitigated and the ulcers had lost the gangrenous appearance. they employed gently astringent gargles, and directed the patient to receive into the mouth the fumes of various substances thrown on live coals.

In the cynanche maligna, as in the other species of sore-throat, we readily determine the composition of the gargle by reflecting on the ends we have in view in prescribing it. Two purposes are served by the employment of gargles in the cynanche maligna; we must frequently wash out the acrid matter secreted in such quantity, which, if allowed to remain in the fauces, at once occasions the spreading of the complaint and disposes to gangrene, and if swallowed, produces still worse effects; while we must, at the same time, more directly counteract the tendency to gangrene by the stimulating property of the gargle.

But as it is impossible, let their employment be as frequent as we will, entirely to wash out the acrid matter constantly secreted in the fauces, the gargles should be mucilaginous, in order, as far as we can, to defend the fauces from its action.

There is still another purpose served by gargles in the cynanche

maligna, which the reader will find particularly insisted on by the best writers. It is to support the secretion of this very matter; for however formidable its effects in the fauces and other parts of the alimentary canal may be, those to be apprehended from its sudden failure, or even from a sudden and considerable diminution of it, are still more formidable.

It is true indeed that the same gargle will not answer all the foregoing indications. The stimulants which we employ with most success for the purpose of checking gangrene, namely, those termed astringents, so far from promoting the discharge of mucus from the fauces, tend to impede it.

It therefore requires some attention after we are made acquainted with all the articles employed in the composition of gargles in this disease, to suit them to the circumstances of the case.

We must be directed by the general tendency of the symptoms. If the flow of mucus has been considerable, if it be suddenly diminished, and especially if any of the symptoms which usually attend such an accident supervene, our measures must be chiefly directed to restore this evacuation. It will then be proper for some time wholly to lay aside the use of astringent gargles. If, on the other hand, the secretion of mucus continues considerable, or has never been so, even although the tendency to gangrene be not very evident, the astringent gargles will generally be found the best.

As other stimuli, which may be termed acrid, tend to counteract any hurtful tendency of astringents and at the same time rather co-operate with them in checking the tendency to gangrene; it is proper in all cases to employ the former.

I may observe by the bye, that the case before us alone is sufficient to point out the error of Dr. Brown in supposing that all substances capable of exciting the living animal solid, act in the same way. When the secretion from the fauces fails, will extract of oak-galls and diluted alcohol (both powerful stimuli) produce the same effects?

There are two kinds of gargles then employed in the cynanche maligna, those composed of acrid, or as they are generally termed stimulating substances, and those composed of these and another class of stimulants, termed astringents.

There is perhaps no case of cynanche maligna in which it is proper to employ gargles merely astringent. Powerful as the Peruvian bark is, a plain decoction of it is far from being a proper gargle in any stage of this complaint.

Among the substances best fitted for the composition of acrid gargles, are the capsicum, myrrh, marine acid, wines that are not astringent, or diluted alcohol in any other form. Except

where our view is particularly directed to increase the secretion from the fauces, a mixture of port wine and finely powdered bark, or the watry extract of bark dissolved in port wine, is perhaps the best gargle we can employ. As soon as the nature of the complaint is determined we should have recourse to this gargle, the frequency of its employment being regulated by the severity of the symptoms. We do not here dread the motion of the fauces in gargling, as in the worst cases of the cynanche tonsillaris. In the cynanche maligna the inflammation generally falls below the degree most favourable to suppuration, so that slight causes, tending to increase it, are not to be dreaded.

We often however have a more perplexing difficulty to struggle with in the cynanche maligna. It is impossible to make children, the most frequent subjects of this complaint, wash their mouth with a gargle and spit it out. We can generally indeed make them swallow a little extract of bark mixed with wine, which is not only a good application to the fauces, but we shall find an excellent internal medicine; but exhibited in this way, it is far from answering the purposes of a gargle, one of the chief of which, we have just seen, is cleansing the throat and preventing the acrid matter from being swallowed. Instead of obviating the symptoms arising from this cause, we are promoting them by constantly exciting swallowing. Many judicious practitioners who have been conversant with this complaint, think that its greater fatality among children than adults, is in a great measure to be attributed to their swallowing the morbid secretion from the throat. This it was observed above, induces vomiting, griping pains, and purging of the worst kind, by causing the complaint to spread along the alimentary canal; and it is very frequently by these symptoms that children are destroyed. These symptoms may in some measure be prevented by from time to time removing the acrid matter by a small sponge at the end of a piece of wood, and by means of another sponge at the other end the ulcerated fauces may be touched with the mixtures best calculated to promote their healing. There is no necessity for using these mixtures in such quantity as to excite swallowing.

Besides the use of gargles, where the sloughs are numerous and extensive, practitioners have had recourse to other means to promote their separation.

The older practitioners having observed that the separation of the sloughs is generally attended with a mitigation of all the symptoms, concluded by a very inaccurate mode of reasoning, that could they by any means procure their separation, the same good effects would attend it, for they did not regard the separation of the sloughs merely as a symptom of returning health, but as the cause of every change which they observed to attend it. On this opinion was founded a practice, the bad effects of which seem now sufficiently ascertained; they endeavoured forcibly to

rub off the sloughs with the finger or an instrument. This practice indeed has been followed even by some late practitioners. But the observations of Dr. Fothergill and others sufficiently warn us against it. "In a case where I was concerned," he observes, "previous to my being called in, a surgeon had endeavoured to separate the sloughs by the assistance of his probe. He succeeded in his attempt without much difficulty, but was surprised to see the same parts covered the next day with thick dark ash-coloured sloughs penetrating deep into the substance."

If, after the use of the foregoing gargles has been continued for some time, we do not find the sloughs beginning to separate, all that can be done is to touch them with some more acrid preparation, the *mel æruginis*, the powder of myrrh, allum, or the marine acid mixed with honey, &c. applied with a pencil or a small piece of rag. It is perhaps unnecessary for me to remark after what has been said, that in this, as in all other gangrenous affections of the throat, the gargles and other application to the fauces should be tepid.

The vapour of water variously impregnated has long been a favourite remedy in *cynanche maligna*. The patient is directed to breathe the steam arising from an infusion of myrrh, camphor, red roses, camomile flowers, &c. in boiling water or vinegar.* In modern practice however these means have been superseded by the foregoing.

The only remaining remedy of any consequence applied to the internal fauces in *cynanche maligna*, is scarification of the parts occupied by the sloughs, which seems upon the whole to do more harm than good.

Of the Local Remedies used externally.

We less generally find occasion for applications to the external fauces in the *cynanche maligna*, than in the form of *cynanche* last considered.

As the pain and swelling are seldom considerable, local blood-letting is rarely to be recommended; when they are considerable, which now and then happens at the commencement, local is preferable to general blood-letting even where the pulse is full. In this, as in all similar cases, leeches are preferable to other modes of local blood-letting.

Scarification and cupping of the shoulders and back of the head have been employed in order to remove the pain in this part of the head, but as far as I have been able to perceive, Dr. Fothergill observes, without much benefit. Dry cupping has

* See Huxham and others on this complaint.

also been recommended, but does not seem to have been attended with better success.

Blisters are warmly recommended by many writers of eminence ; they are particularly serviceable, it is said, in removing the faintness which often accompanies cynanche maligna. The generality of practitioners however have been led by observation to dissuade from their employment. At an early period their application can be of little service ; we seldom have it in view to moderate the inflammation, and when this indication presents itself, it is more immediately answered by local blood-letting. At a later period the application of blisters in the cynanche maligna is frequently followed by mortification. Dr. Clark observes, that he employed blisters in only one case of this disease, and the blistered parts become gangrenous. Mr. Colden and others experienced the same effect from them, and with respect to removing faintness, we shall presently find that we are possessed of much more powerful means for this purpose.

Rubefacients may be employed at least with more safety ; the reader will find them particularly recommended by Quarin, in those cases where the tumor of the glands in the neighbourhood of the fauces is considerable.

Such are the local means employed in the cynanche maligna ; it is chiefly however on general means that we rely for the cure of this complaint.

The reader cannot avoid remarking much affinity between the symptoms of cynanche maligna and the aphthæ infantum. In that part of the treatment of the cynanche maligna which has been considered, the resemblance of the two complaints is also striking ; in what remains to be said, it will be found no less so.

Of the general Means employed in Cynanche Maligna.

The first part of the general treatment in cynanche maligna which demands attention, is diet. At the commencement of this disease, the general excitement sometimes, though rarely, runs high ; the diet must then be diluent and cooling. In the majority of cases however, deficiency of excitement is what we dread at all periods, and the diet should be the same as in typhus.

Mr. Colden and some other writers declare that they have found animal food of every kind hurtful in cynanche maligna. This has been a prevalent opinion respecting all kinds of malignant fevers, it having been taken for granted that as animal substances are more apt than vegetable to run into the putrefactive fermentation, they cannot fail to increase the symptoms of putrescency ; but if the symptoms termed putrid are only the effects of

debility, as all the phenomena of fever seem to shew,* whatever is best calculated to support the vigour of the system, is best calculated to obviate or remove these symptoms. When the symptoms of fever are considerable indeed whether those of synocha or typhus, animal food is injurious ; in the one case proving too strong a stimulus, in the other too powerful an atonic.†

As almost every thing said on the management of the other natural agents as well as diet, in treating of synochus, is applicable here, a few remarks on some of the most important will be sufficient.

The prejudice in favour of general evacuations has extended to the cynanche maligna. It is chiefly at the commencement of the complaint however, that they have been recommended, for even the older practitioners regarded evacuations as inadmissible at an advanced period. Later experience has evinced that this set of remedies, with the exception of a few rare cases, are dangerous at all periods of the complaint. Dr. Fothergill, who was prejudiced in their favour, confesses that even in cases of cynanche maligna where they seem indicated, they are of little service, and should be avoided. "In some of the first cases I met with," he observes, "the quickness of the pulse, the degree of heat, the apparent inflammatory redness of the eyes and face, and pain in the head, sometimes urged me to employ bleeding, especially if there were any marks of plethora, but in these cases it did not appear to have any advantageous effects, so that notwithstanding the vehemency of the symptoms above mentioned, it seems proper in general to omit this evacuation." In another place the same author observes, "it will not perhaps be difficult from such a comparative view to distinguish this disease from a common sore-throat. or an inflammatory affection of those parts in most instances ; but there is another no less certain criterion, though too often a fatal one, which is the constant increase of symptoms upon bleeding, purging, and the liberal use of cooling antiphlogistic medicines, a method which, as it seldom fails to remove a genuine inflammation, if it is early enough and assiduously pursued, so it is too often injurious in the present case."

It is needless to repeat the observations of Huxham, Quarin, Cullen, and indeed all the best writers on the complaint, to the same purpose. "The consequence of evacuations," says Mr. Colden, "is an insurmountable tendency to mortification, so that the very orifice made by the lancet mortifies."

The only case in which Quarin admits of venesection in cynar-

* See what was said on this subject, in the first vol.

† See the observations on the diet in continued fever, in the first vol.

che maligna, is that in which pneumonia supervenes,* and even here he cautions against repeating the blood-letting too frequently, and insists on a circumstance which I have more than once had occasion to mention, that the appearance of the buffy coat does not always warrant a repetition of blood-letting, for under this coat, he observes, there is often a tender black crassamentum, the parts of which scarcely at all cohere. "*Hinc patet,*" he adds, "*quam graviter errant illi, qui ob solam adparentem in sanguine crustam, venæsectionem aut largiorem instituunt aut eam repetunt.*"†

One circumstance particularly demands attention ; when the affection of the fauces has spread to the trachea, the difficulty of breathing it occasions may be mistaken for pneumonia, and venæsection be recommended when it is the most fatal step we could take. Hence probably it is that Dr. Fothergill remarks; that the heat, restlessness, delirium, and difficulty of breathing, which this evacuation commonly prevents or mitigates in other cases, in this are increased by it. Nor does the swelling, he here adds, of the tonsils. fauces, &c. seem to receive the least benefit from it ; on the contrary, though the fulness of these parts decreases, yet the sloughs thicken and change to a livid or black colour, the external tumor grows large, and the spitting commonly diminishes.

The last remark which I shall make on blood-letting in the cynanche maligna is, that we have not here even that argument for its employment which has been so often urged in some other cases of typhus, that a spontaneous flow of blood frequently brings relief, for in the case before us, hemorrhagies, we have seen, from whatever part of the body they occur, are almost uniformly prejudicial.

The inference from all that has been said is plain, that whatever blood-letting may be in other cases of phlegmasiæ, it is not a remedy suited to the cynanche maligna. Thus we find this complaint in its mode of treatment, as in its causes, differing essentially from the diseases with which it is classed.

What has been said of blood-letting is with little change true of purging. We are sufficiently deterred indeed from the use of this remedy in cynanche maligna, by observing that a spontaneous diarrhœa always does harm, and often proves fatal. A tendency to diarrhœa, we have seen, also prevents the free use of cathartics in the aphthæ infantum. In this complaint, which is often produced and more frequently accompanied and increased by foulness of the prima viæ, we are often forced to the employment of cathartics at the commencement. In the cynanche ma-

* This case nearly resembles the pneumonia putrida of foreign writers, which will be considered in treating of pneumonia.

† Quarin De Febribus

signa we seldom have this inducement to recommend them at an early period, so that the regular expulsion of the fæces should be solicited by clysters only, unless the inflammation of the fauces runs high.

In those cases which approach to the nature of the scarlatina, gentle laxatives at the commencement are proper, and, unless the excitement run very high, preferable to blood-letting. Mercurial cathartics in such cases are particularly recommended by Dr. Rush. But wherever the complaint at all partakes of the nature of cynanche maligna, cathartics must be employed with caution. In all cases the constitution of the patient, and the nature of the prevailing epidemic, must influence our practice. It has often happened in this complaint, from want of a due attention to these, that even a mild cathartic, under circumstances in which it did not seem a doubtful remedy, has been followed by a retrocession of the eruption, and a train of the most alarming symptoms.

It was observed of the *aphthæ infantum*, that however dangerous the employment of cathartics, and however much to be dreaded spontaneous diarrhœa is, during the greater part of the complaint, yet that when the latter occurs towards the termination of the complaint, and after the febrile symptoms are nearly removed, it ought to be encouraged, and that if it does not, the exhibition of cathartics is necessary, in order to cleanse the intestines from the sordes accumulated in them during the disease. The same may be said of the cynanche maligna. Towards the termination of this complaint also the stomach and bowels are often loaded with irritating matter, particularly when the sloughs have spread to these cavities. However ill adapted to the commencement of cynanche maligna, Quarin observes, cathartics may be, they become necessary towards its termination, in order to expel from the bowels the putrid colluvies, by which the fever is protracted, the appetite destroyed, the abdomen swelled, and glandular obstructions formed.

Yet, as in the *aphthæ infantum*, the use of cathartics even at this period requires caution; we must not mistake a temporary remission of the symptoms for a solution of the disease. A healthy appearance of the throat, and an abatement of all the febrile symptoms, must insure us of its safety, and we must employ only the mildest cathartics.

Emetics, says Dr. Cullen, both by vomiting and nauseating, prove useful, especially when early employed. The advantage derived from emetics at the commencement of the cynanche maligna, has been remarked by practitioners from its first appearance in Europe. It is chiefly, if not solely, however, at the very commencement of the complaint that they are serviceable. At a more advanced stage the effects of vomiting are too debilita-

ting, and the danger of inducing hypercatharsis renders the use of nauseating doses precarious. We find many condemning all kinds of antimonials in this complaint, which, even when the view is to produce vomiting, are given in small and repeated doses.

One principal evacuation still remains to be considered, that by the skin. Physicians have not in the cynanche maligna, as in many other febrile diseases, endeavoured by the hot regimen to induce sweating, the bad effects which would have attended this practice were too apparent. Diaphoretics however have been generally recommended, and although not to be ranked among the most powerful medicines in this complaint, are often serviceable. Of these the preparations of opium are the most powerful, and as they tend to procure sleep, and check the tendency to diarrhœa, they are valuable medicines in cynanche maligna.

Nitre and other neutral salts have been generally recommended for the same purpose. I have already had occasion to remark however, that this class of medicines seem generally to do harm where the symptoms of typhus are well marked. "Nitrous cooling medicines," Dr. Fothergill observes, "frequently produce the like effects; they increase that faintness which accompanies this disease, and either dispose the patient to copious sinking sweats or to stools." The reader will also find the use of this class of medicines in the cynanche maligna reprobated by Dr. Johnstone and others.

The pediluvium has been frequently employed in this disease for the purpose of promoting perspiration; at an advanced stage its effects are too debilitating, and at all periods, if the symptoms run high, the trouble attending its use more than compensates for any good effects it may have. In milder cases it is often serviceable.

With respect to the long list of diaphoretics enumerated by authors, many of which I have had occasion to mention at different times, they are upon the whole very feeble medicines in the cynanche maligna, and when given freely, by oppressing the stomach, often do harm.

The most powerful set of medicines, those which increase the general excitement, on which practitioners now almost wholly rely in the treatment of this disease, still remains to be considered.

Cordials, or rather medicines which they termed cordials, were much employed by the older practitioners. These indeed and gentle diaphoretics, if we except evacuations, were the chief general means they employed, for they did not seem aware of how much the state of the throat in this disease depends on that of the system in general; and finding the danger always proportioned

to the violence of the local symptoms, they regarded local remedies as those to which they were almost solely to trust.

They employed many articles as cordial and alexipharmic, most of which are possessed of little or no virtues, such as the bezoar stone, a concretion found in the stomach of some animals of the goat kind, which seems to possess no other medical virtue but that of a very weak antacid, and may be taken without any sensible effect in the dose of some drams, although generally prescribed in that of a few grains; the Armenian bole, a gently astringent earth; various precious stones; the juice of various fruits; the flower of the bugloss, one of those flowers called cordial, but now deservedly neglected; borage, endive, scordium, scorzonera, scabiosa, &c.

Is it not surprising that the Italian and Spanish physicians, who first treated the cynanche maligna, should employ these articles with the express view of restoring the vigour of the system, and very generally neglect the best of all cordials which their climates offered them in such abundance, the various kinds of wine? Need we wonder that experience taught them to trust but little to their general remedies? Some indeed recommended medicines from which rather better effects might be expected, the carduus benedictus, ammonia, various aromatics, and even a little wine.

Warm aromatic and cordial medicines are still much recommended in cynanche maligna, and it has justly been observed, that when the throat assumes a gangrenous appearance, and the debility indicated by depression and faintness is considerable, we must not be deterred from the use of such medicines, either by the great frequency of the pulse, or increase of temperature. Complex formulæ were once much employed in all diseases, and many still recommend a variety of ingredients for the composition of these medicines, but it seems now to be the opinion of most practitioners that their effects are very generally proportioned to the quantity of wine and bark they contain.

The most judicious practitioners therefore have almost wholly laid aside the use of other articles, as producing hardly any other effects but those of exciting disgust and oppressing the stomach, and thus preventing the patient taking the necessary quantity of the bark and wine.

The rules for giving the bark and wine are the same as in typhus, except that, on account of the presence of gangrene, the bark is given in larger quantity, always in the well marked cynanche maligna in as large quantity as the stomach will bear.

Since these medicines were given with freedom, physicians have changed their opinion of the comparative effects of local and general means in this complaint. They have found that no

applications to the fauces are of such moment as large doses of bark and wine received into the stomach, and if we can judge from what we now see, the cynanche maligna must have been fatal indeed before these medicines were recommended.

It is almost needless once more to observe, that the plain powder is the best preparation of the bark; but unfortunately we cannot always prevail on the patient to take it, and it often oppresses the stomach.

It is frequently impossible to persuade children, the most frequent subjects of this disease, to take the bark in powder. Dr. Clark gave a decoction of it with a sixteenth part of spirituous cinnamon water sweetened with extract of liquorice, or acidulated with lemon juice, or the vitriolic or marine acids, and "in one or other of these forms," he observes, "it very seldom happened but the youngest patient could be prevailed upon to use it." To this preparation he gradually added more and more of the powder, as he found the patient could be made to take, and the stomach would bear it.

Dr. Fothergill endeavoured to remove the difficulty in another way. "The difficulty," he observes of prevailing upon children affected with this distemper to take any kind of medicine, "put me early on trying the bark in clysters, and sometimes when there seemed very little chance of relieving them by any means. To very young children, two or three drachms of the bark in fine powder have been given every six hours in three or four ounces of broth as a clyster, adding a small quantity of the electuarium e scordio to the second or third, if the first was discharged too speedily.

The use of the bark, we have seen on other occasions, is sometimes attended with costiveness, and sometimes with purging. In the case before us, the former effect should be obviated by clysters only, and even these ought not to be too frequently repeated. The latter effect must be obviated by very vigorous means, which we are presently to consider.

With regard to the barks or other medicines to be had recourse to when the Peruvian bark fails, or cannot be procured, I may refer to what was said in treating of intermitting fevers. The observations then made are applicable here, with the exception of what was said of metallic and saline preparations, almost all of which, we have reason to believe, would prove hurtful in cynanche maligna.

One article however which has been lately introduced into the treatment of this complaint demands particular attention. I have already had occasion to mention the capsicum among the local remedies employed in the cynanche maligna, but it would appear from a variety of observations, that it is more successful when used internally. It has been given in very considerable do-

ses, and in some epidemics seems to have succeeded better than the bark. There has not however been a sufficient number of trials to ascertain the cases to which it is best adapted.

Mr. Stewart* was one of the first who prescribed the capsicum internally in the cynanche maligna. He directs two table spoonfuls of the small red pepper, or three of the common Cayenne pepper, and two tea spoonfuls of fine salt, to be beat into a paste, on which half a pint of boiling water is poured, and strained off when cold; an equal quantity of very sharp vinegar being added to this infusion, a table spoonful of the mixture every half hour is a proper dose for an adult; and to this, we are informed, cases yielded which had resisted the bark and wine. Under Mr. Stephens's care it was also exhibited with the best effects to 400 patients, and seemed to save some whose state was thought desperate before they had recourse to it.

In Mr. Collins's paper on the cynanche maligna the reader will also find the superiority of the capsicum to the bark maintained. Mr. Collins at first gave the bark and capsicum together, but by subsequent trials he was led to trust to the latter alone.†

Swallowing the infusion, he observes, occasioned slight convulsive motions, and a sensation of heat in the œsophagus and stomach, and in a short time after it was swallowed, it produced a general glow over the body, but without considerably affecting the pulse. Mr. Collins used Mr. Stewart's preparation of the capsicum, but he thinks there is no occasion to make the dose so large, smaller doses answering equally well.

It only now remains to make a few observations relating to certain symptoms, the treatment of which does not come under the general plan of cure, namely, diarrhœa whether spontaneous or induced by the unguarded use of cathartics, obstinate vomiting, hemorrhagies, suppression of urine, which occasionally attends all diseases of debility and dyspnœa.

The means for stopping diarrhœa are, 1st, Such whose action is confined to the intestines, either diminishing the secretion from their surface and allaying the peristaltic motion, or exciting them to a more speedy evacuation of the offending matter, or tending to correct its morbid properties. 2dly, Such as act on other parts of the system, there exciting certain motions in some measure incompatible with those supporting diarrhœa; and lastly, those which tend to restore the general vigour of the system.

The means answering these different purposes I have already,

* See the 12th vol. of the Medical Commentaries.

† Mr. Collins also mentions cases of remitting fever which yielded to the capsicum.

on different occasions, had an opportunity of mentioning. The means which diminish the peristaltic motion and the secretion from the surface of the intestines, are opiates and astringents. These are indicated on the appearance of diarrhœa at any period of the complaint, except in the decline of the disease, when the diarrhœa, we have seen is salutary, not only by evacuating the noxious matter which accumulates in the primæ viæ during this disease, but tending to prevent or moderate the anasarcaous swelling which frequently follows it.

Of those which excite the intestines to increased action, that the offending matter may be the more speedily evacuated, rhubarb and aloes are best, because, while they evacuate the contents, they tend to restore the vigour, of the alimentary canal. They are chiefly indicated in diarrhœa at the decline or commencement of the complaint, for in its progress we are in no case perhaps to risk a hypercatharsis by promoting the diarrhœa, from whatever cause it may proceed.

With regard to correcting the morbid properties of the contents of the primæ viæ, there is nothing to be added to what I have more than once had occasion to say. At all periods of the complaint acids are proper if the stomach and bowels are loaded with bile; if with acid, absorbents.

The means which excite motion in some measure incompatible with catharsis, and thus tend to allay it, are diaphoretics and emetics. Of the diaphoretics employed in this complaint, opium, it has already been observed is the most powerful, so that in this way also as well as by its action on the bowels, it tends to check diarrhœa. It is proper, when the tendency to diarrhœa is considerable, to avoid the application of cold, but even here much warmth is inadmissible.

Emetics often have a considerable effect in checking diarrhœa, partly by counteracting the peristaltic motion, and partly by promoting perspiration. Their debilitating tendency however renders them admissible only at the commencement of the complaint, at which, we have seen, they are otherwise indicated.

With regard to the means which tend to check diarrhœa by restoring the vigour of the system, there is nothing to be added to what has just been said of them.

Vomiting seldom proves obstinate in this complaint, nor does it frequently occur under circumstances which should induce us suddenly to check it. It generally arises from the presence of irritating matter in the stomach, and when it occurs at the commencement should be encouraged by camomile tea, or even a dose of ipecacuanha.

Dr. Fothergill recommends for this purpose an infusion of green tea or carduus benedictus, and observes, that by this me-

thod he has seen the disease go off with much more ease than was at first expected. On the evacuation of the offending matter the vomiting generally ceases ; when it does not. a saline mixture in a state of effervescence often allays it ; or a clyster sometimes succeeds ; for as an emetic tends to check catharsis. catharsis tends to check vomiting. If these means fail, a dose of solid opium, or opium and camphor, will generally prove successful. If it is rejected, it must be repeated till retained.

Hemorrhagies, particularly in the advanced state of the disease, we have seen are among the worst symptoms. They not only demonstrate the progress which the complaint has made, for in this disease they are almost always the consequence of debility, and very frequently indicate gangrene, but they produce the same effects which might be expected from artificial blood-letting employed at the most improper period of the disease.

In hemorrhagy from the throat or any part of the head, the nose, mouth, ears, &c. a mild clyster should be exhibited, and the patient kept as much in the erect posture as he can easily bear. In all cases of hemorrhagy he must be kept as cool as possible, so as not to risk an alarming diminution of temperature; the quantity of bark and wine must be increased, and their effects aided by the addition of alum or vitriolic acid ; while we apply cold vinegar and water and astringents, by means of tents or otherwise as near as we can to the orifices of the bleeding vessels. If these means fail, the hemorrhagy, for the most part, soon proves fatal ; and when they succeed, their effects are often transitory.

In suppression of urine also a mild clyster is the first expedient, and if the patient has been long costive, some cathartic ingredients should be added to it. Emollient fomentations, or cold applications on the region of the bladder, are sometimes successful. It has just been observed, that in the cynanche maligna this symptom is very frequently the consequence of debility. I have seen it nearly induced where there was no complaint but debility from want of food. Suppression of urine therefore in this disease generally indicates the necessity of pushing as far as possible the invigorating plan. If other means fail, we must call in the assistance of the surgeon, which should not be too long delayed. It is of consequence in preventing this symptom, frequently to remind the patient of emptying the bladder ; suppression of urine is most apt to supervene when the muscular fibres of the bladder are stretched.*

Of dyspnœa little need be added to what has already been said. If accompanied with pain in the thorax, there is reason to believe

* See what was said of this symptom in speaking of the treatment of small-pox.

that it proceeds from inflammation of the lungs, and it must be treated accordingly. It may proceed from this cause indeed although unattended with pain; the nature of the case is then ascertained with much difficulty.*

If the dyspnœa proceeds from the swelling of the glands about the fauces, we must, as in other similar cases, have recourse to local blood-letting and blisters, if the state of the patient will admit of it; if it will not, fomentations and rubefacients are the best substitutes. Mr. Colden recommends in this case fomentations with bitter and aromatic herbs. If such means fail and suffocation is threatened, bronchotomy is the only remedy.

SECT. III.

Of the Cynanche Parotidea.

THE Cynanche Parotidea, called in English the Mumps, is generally so mild a complaint as not to require the assistance of the physician; it will not therefore be necessary to consider it much at length. It is defined, we have seen, by Dr. Cullen, that species of cynanche in which there is great external swelling from an enlargement of the parotid and maxillary glands, the respiration and deglutition being little disturbed, and the fever, for the most part, a gentle synocha.

This short account of the symptoms is sufficient for ascertaining the presence of the disease. The prognosis is uniformly good, with one exception, which is the only case that requires any particular attention.

Towards the termination of the cynanche parotidea, that is, about the fourth day, when the swelling of the glands about the fauces begins to abate, some degree of tumor frequently affects the testicles in men, and the breasts in women. Sometimes, though not frequently, they become very hard and painful, in general however with little fever.

But it now and then happens either when the tumor of the breasts or testicles does not succeed that of the glands about the fauces, or when the former does succeed the latter but suddenly recedes, that the fever, which has been very mild from the beginning of the complaint, and which generally abates when the swelling of the fauces begins to recede, suddenly becomes considerable, is sometimes attended with delirium, and has even proved fatal.

This species of cynanche, like the last, is frequently epidemic, and evidently arises from contagion. Children are the most fre-

* See what will be said of pneumonia in the next volume.

quent subjects of it. I have seen hardly one escape it, in a school of about five hundred boys.

In its usual form it hardly requires any particular mode of treatment. If we except a cooling cathartic, avoiding animal food and exposure to cold, is all that is necessary.

When the train of symptoms just alluded to supervene, it requires more attention. With the mode of treatment however the reader is already acquainted, as it differs in no respect from that of common synocha, in which the same degree of excitement prevails, with the addition of local remedies to bring back the swelling to the breast or testicle if it has receded. The continued application of warm fomentations is the best means of recalling it.

Whether or not fomentations applied to the breasts or testicles would prove serviceable where this train of symptoms supervenes without having been preceded by any swelling of these parts, has not been ascertained.

SECT. IV.*

Of the Cynanche Trachealis.

THE only form of Cynanche which remains to be considered, is the Cynanche Trachealis; Dr. Cullen's definition of which has been given.

It seems proper in the present state of medical knowledge to divide this complaint into two varieties; that which we sometimes meet with in adults, and that which attacks children from the time they are weaned till about twelve years of age.

The former of these complaints, if indeed they are different complaints, has been long known, although it rarely occurs, now and then appearing alone, rather more frequently complicated with the cynanche tonsillaris or maligna.

Its presence is readily known from the definition which has been given. The voice and cough, if there be any, for a cough does not constantly attend the disease, have a peculiar ringing sound. The respiration is difficult, sonorous, and attended with a sense of tightness and pain about the larynx. On inspecting the fauces we perceive nothing uncommon, they are sometimes redder than usual, but very seldom much swelled. When there is much redness or swelling, the disease must be regarded as a combination of the cynanche trachealis and tonsillaris. The eyes are red, the face is flushed, and as the difficulty of breathing increas-

* The 4th Vol. of the London Edition begins with this Section.

es, becomes swelled and purple. These symptoms never continue long without considerably affecting the pulse and the fever which attends them is a synocha, at least at its commencement. Towards the termination of the complaint, when the symptoms have been considerable, the pulse and strength sink.

One of the chief diagnostic symptoms of cynanche trachealis is, that however great the affection of the larynx and the dyspnœa may be, the deglutition is free. It has long been a maxim in medicine, even before there were any distinct ideas respecting this complaint, that that species of cynanche in which the respiration is impeded without any redness or swelling appearing in the fauces, is most to be dreaded.* It will not be necessary to say more of the symptoms of this complaint as it appears in adults. The degree of danger is best known from the degree of dyspnœa. Suffocation is the termination which we dread.

With regard to the other variety of the cynanche trachealis, that which affects children only and which has not till lately been accurately described it will be necessary to consider its symptoms more at length. It is a much more frequent complaint. Among the vulgar in England it is termed the croup or the rising of the lights. In some parts of Britain it is also known by the names of the choak or the stuffing. The reader will find it mentioned by authors under a variety of appellations, morbus strangulatorius, cynanche stridula, angina epidemica, suffocatio stridula, asthma infantum,† angina polyposa, and some others.

There has been some dispute concerning the nature of the croup. It will be proper to make some observations on this part of the subject after a more detailed account of the symptoms has been laid before the reader.

Of the Symptoms of the Cynanche Trachealis Infantum.

To begin with the local symptoms, which are generally the first that shew themselves, it may be observed, that this complaint often makes its attack merely with a degree of dyspnœa, which often comes on very suddenly. As this affection increases, the breathing is performed with a wheezing sound, as if the passage of the air were much straitened.

The patient at the same time, if he is old enough to give an account of his feelings, complains of a sense of tightness about the larynx, generally accompanied with some degree of pain. Some

* Gravis et illa species anginæ, (Horstius observes) cum gutturis interni musculi sic inflammantur, ut neque in facibus neque in cervice, quidpiam adpareat, unde Celso merito pestiferus, Galeno morbus extreme peracutus, Hippocrate vero lethalis dicitur.

† We shall find reason to believe that the complaint known by this name has been improperly considered as the same with the croup.

pain may often be perceived on turning the head, when there is no pain felt while it is still.

The dyspnœa sometimes increases rapidly, in other cases so slowly that the patient shall complain of some difficulty of breathing for several days before he is seriously ill. Together with the wheezing there is sometimes, though rarely, a degree of rattling in the breathing. The state of the breathing at length becomes such, that the shoulders are raised at each inspiration, the abdominal muscles act strongly, and there is a violent alternate elevation and depression of the ribs and scapulæ. The breath at the commencement of the disease is generally free from fetor, but seldom remains so in its progress.

The voice has a shrill ringing sound, which has been compared to a noise issuing from a brazen tube, or the crowing of a cock. A cough very generally attends the cynanche trachealis of children, which also partakes remarkably of the same sound.* The cough is generally dry. When there is any expectoration, it has frequently, especially after the disease has lasted for some time, a purulent appearance, and is often mixed with specks of florid blood. The purulent appearance of the sputa is an unfavourable symptom; they sometimes have more of a white cheesy appearance, and flakes are sometimes thrown up by coughing, resembling pieces of a membrane which we shall find lines the trachea in this complaint, the expulsion of which often brings considerable relief.†

There is generally nothing particular to be observed in the fauces. Sometimes they look red and even a little swelled, at other times the uvula, velum pendulum palati, and tonsils are intensely red, but without swelling; and we sometimes observe a little pus-like matter in the fauces, similar to that spit up.

As in the cynanche trachealis of adults, the deglutition is scarcely ever difficult or even at all impeded.

The appearance of the face is the same as in other instances of great dyspnœa, at first red and swelled; sooner or later, if the complaint increases, becoming purple and livid. There is often a degree of soft white swelling externally about the larynx, which sometimes spreads along the course of the trachea. The hands and feet too are often affected with the same kind of swelling.

Such are the local symptoms of the croup, and those which

* Dr. Rush says he has often seen the croupy cough remain several days after all other symptoms of the complaint were gone. I have known this cough return in those who had formerly laboured under the croup on exposure to cold, without any other symptom of the disease, and go off without any remedy.

† Michaelis says he has seen the patient suddenly restored to health by the excretion of this membrane. Michaelis de Ang. Polyp

may be said to constitute the disease, the general symptoms not differing materially from those attending most other phlegmasiæ.

It has already been observed, that symptoms of general derangement are seldom the first which shew themselves in this disease ; in some cases, however, they are the first of which the patient complains, being oppressed with a general lassitude and languor before the dyspnœa becomes very troublesome ; this however is comparatively rare.

As soon as the difficulty of breathing is considerable, the pulse becomes frequent, strong, and hard. and the patient is troubled with head-ache ; he soon becomes restless, with a hot parched skin, great thirst, and a white and often very foul tongue.

The urine is generally limpid, discharged in small quantity, and sometimes with difficulty. In the progress of the disease it is passed in greater quantity. is turbid, and towards the favourable termination generally deposits a copious sediment, which by some has been attributed to the absorption of purulent matter from the trachea.

The bowels are generally costive during the whole of the complaint, and often much inflated. Vomiting is not a very common attendant on the croup ; when it does occur, much viscid matter, sometimes mixed with bile, is frequently discharged by it.

If the symptoms prove obstinate, the pulse begins to lose its strength and hardness, and becomes weak and intermitting or tremulous, and as the fatal termination approaches, remarkably frequent.

In the cynanche trachealis, as in most other phlegmasiæ, however alarming the other symptoms of fever may be, there is seldom any delirium. The patient generally retains his senses to the last, except that a degree of coma frequently supervenes.

If the symptoms do not remit, unless they be very mild, the patient seldom survives more than three or four days, and frequently dies within four and twenty hours, or even less from the attack of the disease. In the more lingering cases the symptoms gradually increase, and many of those which precede death in other febrile diseases supervene. The mouth becomes very foul ; the respiration more hurried, small, and difficult ; the restlessness and dejection increase ; and under these circumstances that species of delirium which is most allied to coma sometimes supervenes, the patient seeming stupid, and frequently muttering to himself with marks of great impatience. The pulse in such cases is often near two hundred, tremulous, and irregular. At length it can hardly be felt, the extremities become cold, and the patient soon expires.

Death sometimes approaches in a different way ; profuse sweats

and fainting fits precede the coldness of the extremities. The eyes appear glazed, the lips, tongue, mouth, and throat parched, and the patient falls into general convulsions, which prove the immediate forerunner of death.

Some of Dr. Molloy's patients* had a tumor behind the ears, which run speedily to mortification, and many, he observes, had prodigious weeping behind the ears of a very corrosive nature.† The ceasing of the cough is to be ranked among the fatal symptoms, as we might, a priori, have supposed, since its absence can only be attributed to increasing insensibility, and robs the patient of one chance of life, by depriving him of the chief means of removing the matter which clogs the trachea and often occasions suffocation.

But whatever accidental symptoms, if I may use the expression, may appear in particular cases, if the strength fail, the breathing become remarkably small and hurried, if the face assume a livid and cadaverous appearance, if the pulse flutter, and the extremities become cold, we know that death is at hand.

Suffocation may take place at all periods of the disease. When the patient dies on the first or second day, it is generally from this cause. Death from other causes seldom happens earlier than the third, often on the fourth or fifth day, or later.

Certain symptoms in this, as in other febrile diseases, are frequently attended with a remission, sometimes with complete recovery. The chief of these is a spontaneous flow of sweat, which sometimes lasts for several days. Spontaneous vomiting and diarrhoea also sometimes mitigate the symptoms of the croup. The same may be said of a discharge of phlegm from the nose, (Dr. Bard says salivation sometimes proves critical) even coughing and eructation often bring relief. A copious sediment from the urine is also regarded as critical in this complaint. Dr. Rush observes, that he has frequently seen an eruption of little red blotches in the croup which generally brought relief. He sometimes observed them appear and disappear several times in the course of the disease.

Upon the whole, whatever be the attending symptoms, if the pulse become fuller, more steady, and less frequent, the breathing freer and less hurried, the peculiar sound of the voice and cough begin to wear off, and the patient appear less anxious and oppressed, the prognosis is good. We cannot however with certainty rely on the favourable change till the remission has lasted

* Their complaint seems to have been rather the acute asthma, than the croup.

† Dr. Bard saw the cynanche maligna complicated with croup epidemic. In some patients, instead of the croupy symptoms, there were ulcers behind the ears. See the American Phil. Transact. vol. 1.

a considerable time, for after the most favourable appearances the disease has returned with greater violence and proved fatal.

The disease described by Dr. Miller, under the name of acute asthma, which seems at least allied to the disease we are considering, often wholly assumes the intermitting form, as appears both from his observations and those of Dr. Molloy and Dr. Rush. It is on this account that Dr. Miller terms this complaint asthma. He adds acute, to distinguish it from chronic asthma, into which, he observes, he has seen it changed, the patient ever after remaining subject to the latter disease.

It is of the first importance to distinguish a remission, from a complete solution of the disease; a mistake here, by inducing the practitioner to abandon the means of cure too early, has frequently proved fatal. All that can be said on this head is, that where the patient still remains dejected, and oppressed, however free the breathing may be, we have reason to dread a return of the complaint, and should treat him accordingly; and the more the symptoms have inclined to those of acute asthma, (of the diagnosis between which and the croup I am about to speak more particularly) the more reason we have to dread that the relief will only be temporary.

Dr. Home divides the croup into two varieties, the one he terms the inflammatory, the other the purulent. In the former, the pulse is strong, the face florid, the drought great, and the complaint, Dr. Home observes, is relieved by evacuations; in the other, the pulse is frequent and soft, the debility great, the tongue moist, the drought less than in the former case, the anxiety much greater, and here, he observes, evacuations hasten death. It would appear, however, that these ought rather to be esteemed different stages than varieties of the disease, the former, if the symptoms are not soon relieved, degenerating into the latter.

Such is the general course of the *Cynanche Trachealis Infantum*; in it, as in almost all other complaints, we occasionally meet with certain anomala, which do not deserve to form part of the history of the disease. Thus it has appeared unaccompanied by fever, as observed by Dr. Rush and others,* the shrillness of the voice and cough, Dr. Home observes, sometimes goes off before death; even the leading symptoms, the dyspnoea and cough, are occasionally absent during some part of the disease. It may be mentioned among the anomala of the croup, that the membrane excreted by coughing has sometimes appeared black and gangrenous.

I have already observed that the croup and the acute asthma of

* Dr. Dixon gives an account of a case in which the *cynanche trachealis* appeared as a chronic complaint in an adult. See a paper by Dr. Dixon, in the 9th vol. of the *Medical Communications*.

Dr. Miller and others, usually regarded as the same disease, are suspected by some to be of a very different nature, and it has even been asserted that a perfect diagnosis between them may be obtained. The following is offered by Michaelis.

All the convulsive affections, he observes, are more violent in the acute asthma, than in the croup. In the former the difficulty of breathing is greater. The acute asthma makes its attack almost instantaneously, giving no warning of its approach ; the croup comes on more gradually. In the acute asthma the peculiar shrillness of the voice and the pain of the trachea increased on pressure, almost constant attendants on the croup, are never observed. The acute asthma observes certain periods. In this complaint the urine is thin and watery ; in the croup at the beginning red, afterwards turbid and white. The pulse in the acute asthma is small and contracted ; in the croup at its commencement, hard, full, and inflammatory, afterwards soft and weak.

The reader will find from what Dr. Cullen says in the last edition of his *Nosology*, that notwithstanding the attempt of Michaelis to distinguish these complaints, with which he must have been acquainted, as he there mentions Michaelis's treatise he still seems to regard them as the same disease. The observations of some succeeding authors, however, seem to confirm those of Michaelis, and improve the diagnosis he has offered. The acute asthma, says Dr. Rush, or as he calls it the *Cynanche Trachealis Spasmodica*, comes on suddenly, and generally in the night. It has frequent and perfect intermissions for hours, and in some instances for days, without the least sensible discharge from the trachea, and it yields to antispasmodic remedies, particularly to the warm bath. The croup, or, as Dr. Rush calls it, the *Cynanche Trachealis Humida*, comes on gradually, and most commonly in the day time. It continues or increases for several days without any remarkable remission or even abatement of the symptoms. It is accompanied with a discharge of phlegm or mucus from the trachea or together with the stools, and does not yield to antispasmodics.

When the foregoing circumstances are well marked, they will generally be sufficient to distinguish the complaints ; but they are far from always being so. The croup, in particular, often assumes more or less of the intermitting form ; and with regard to the latter part of the diagnosis, a diagnosis from the effects of remedies is always objectionable, and particularly so in a disease so rapid as the croup. The above diagnosis however will frequently enable us to distinguish the diseases, and must serve till experience has furnished a better. To the circumstances mentioned, it might be added, that the voice in the acute asthma is often hoarse, and the breathing not wheezing but rattling.

It is asserted by some that the peculiar membrane lining the

trachea in the croup, is not found in those who die of acute asthma. When I cast my eyes on Dr. Miller's chapter, entitled, Dissections, I expected to see this point determined, but Dr. Miller gives us an account of only two dissections, and of these so imperfect an account, that it is impossible to know whether or not the membrane was present.

From the observations of others, however, we have reason to believe that the membrane is not formed in the acute asthma. Dr. Rush, in his first publication on these complaints, confounds them ; but in a later treatise, in which he attempts the diagnosis, gives us an account of the dissection of a child that died of the acute asthma, in which no membrane nor even mucus was found in the trachea, this organ and the lungs appearing in a perfectly sound state. I believe the membrane, says Dr. Rush,* to be the effect of the croup only, and not an accidental effect of the spasmodic asthma as I once believed. The sudden manner in which the convulsive asthma makes its attack, and its so frequently assuming an intermitting form, oppose the idea of its being connected with the formation of a membrane in the trachea.

It is to be observed however, that, contrary to what is generally supposed, the symptoms of croup are not essentially connected with the presence of this membrane. The ringing voice has often disappeared, especially towards the fatal termination, where the membrane certainly was present. This happened in the sixth case related by Dr. Home. Dr. Bard observes, that all the symptoms of the croup often intermitted where the membrane was found after death. Nor have we the least reason to suppose the membrane formed in all cases as soon as the voice and cough become ringing. A case is related in the Philosophical Transactions of a boy who died of a phthisis ; a membrane was found in the trachea, pieces had often been spit up, but no shrillness of voice is mentioned among the symptoms. The reader will find a similar case related by Dr. Dixon, in the 9th vol. of the Med. Commun. in which the membrane was repeatedly formed and spit up without any shrillness of voice ; and Dr. Bard, on the other hand, gives a case in which the symptoms of croup were well marked where no membrane but merely signs of inflammation were found in the trachea.

Michaelis has not only attempted to distinguish the croup and acute asthma, but also offers a diagnosis between the former and mere inflammation of the trachea. But in this instance he has succeeded worse than in the other.

The cynanche trachealis, he observes, may easily be distinguished from the croup. In the former there is no symptom of a preternatural membrane present in the trachea and bronchiæ. But is not the great dyspnœa one of the principal symptoms of

* See his Medical Obs. and. Inq. vol. 1.

its presence ? But the dyspnœa, he proceeds, can be accounted for by the force and violence of the inflammation independently of any other supposition. But are there not the same symptoms of inflamed trachea in all cases of well formed croup ? In the cynanche trachealis, properly so called, he continues, there is wanting that peculiar shrillness of voice which we observe in the croup, the angina polyposa, or membranacea, as Michaelis calls it. But other authors have made different observations ; Dr. Cullen remarks, that the ringing voice does attend the cynanche trachealis of adults. In the cynanche trachealis, Michaelis adds, there is a violent pain about the trachea ; in the croup but very little. Different degrees of the same symptom, it is evident, must afford a diagnosis little to be depended on. The reader besides will recollect that the pain in the croup, as observed above, is increased on pressure ; a circumstance we shall find peculiarly characteristic of pain proceeding from inflammation.

There is one case which it is of much consequence to distinguish from the croup, namely, the symptoms produced by the introduction of an extraneous body into the trachea. Mr Balfour told me, says Dr. Home, that he attended a child in a disease which from the similarity of voice, appeared to him the croup. The child died, and a piece of shell which he had sucked in with the breath was found lying across the trachea, about an inch below the glottis, and the membrane was inflamed and dry. Here even Michaelis confesses the diagnosis to be extremely difficult, and that the most acute may find it impossible to distinguish the two cases. But even here, he observes, a cautious physician may proceed with safety ; he should enquire with much care whether or not the patient feels any pain, whether it is acute, and in what place it is seated, if he feels no pain, or if the seat of the pain is not in the trachea but in some of its branches, or if it changes its place, being felt during coughing in the upper, and at other times in the interior part of the trachea, or, lastly, if it occupy the trachea and it solely, but is extremely acute and circumscribed, for if such be the symptoms the case is not to be regarded as croup, but as symptoms occasioned by an extraneous body in the trachea. If even these symptoms, he adds, should leave me in doubt, I would immediately have recourse to bronchotomy, by which the nature of the disease would be discovered, and the noxious body, whether produced by or introduced into the trachea, removed.

When a similar set of symptoms, which sometimes happens, arises not from the introduction of an extraneous body into the trachea, but from the generation of some excrescence or concretion different from that which takes place in the croup, it is, if possible, more difficult to ascertain the nature of the case.

With regard to the manner of distinguishing the croup from other diseases, such as cynanche maligna hooping cough chronic asthma, epilepsy, hysteria, pneumonia, &c. with which it

seems to have sometimes been confounded, it is only necessary to say, that if we are acquainted with the symptoms of these complaints, it is impossible to mistake them for the croup.

Appearances on Dissection.

ON laying open the trachea of those who die of the croup, there is a membrane lining but scarcely adhering to it. for it may always be easily separated without destroying its shape. It comes out in the form of a tube exactly adapted to the cavity it lay in. In many cases indeed it cannot be said to adhere at all, and there is a considerable quantity of puslike matter lying between it and the sides of the trachea. This membrane often extends beyond the division of the trachea, lining the large branches of the bronchiæ, and loosely adhering to them. The purulent matter extends beyond the membrane often into the smallest branches of the bronchiæ and even in some instances into the air vesicles. Mr. Wood found it in these vesicles in the 7th and 8th cases related by Dr. Home. On removing it there is no appearance of ulceration in the coats of the trachea and bronchiæ, but the traces of inflammation are in general very obvious, and sometimes extend, Burserius observes, to the very extremities of the bronchiæ. It has sometimes happened, as in more than one dissection recorded by Dr. Home, that no traces of inflammation could be observed; but this is comparatively rare.

By squeezing the lungs a considerable quantity of a whitish glutinous fluid may sometimes be forced out. In different cases of the cynanche trachealis the lungs assume, according to Burserius, all the different appearances observed after pneumonia, which are soon to be laid before the reader. Sometimes, however, they are quite sound. The appearances of the lungs in those who die of the croup. Michaelis observes, are various; sometimes they are sound, sometimes slightly inflamed, sometimes there is a sanious matter extravasated in different parts of them, sometimes the matter found in them is purulent, and sometimes merely a watery fluid, the quantity of which is often considerable.

Small polypous concretions are often found in the vessels of the lungs and in the right side of the heart; never, Burserius observes, in the left side or in the aorta. These concretions, I have already had occasion to observe, seem to be formed in articulo mortis, and the reason of their not being found in this case in the left side of the heart, seems to be, that the blood is chiefly collected in the right, as happens in all cases where death is induced by suffocation. It is also owing to the dyspnœa which precedes death that the vessels of the head are generally found very turgid in those who die of the croup.

The preternatural membrane presents different appearances in different cases. Sometimes, Michaelis observes, it is as thin

as paper, in other cases so thick that it almost fills up the whole cavity of the trachea. It is often of different thickness in different parts, and the thickest part is sometimes the uppermost and sometimes the reverse. In some cases it is soft and pulpy, in other cases so firm and tough that it will bear maceration in water for several days; but however tough it is in the trachea, it becomes more tender in the bronchiæ and is always soft before its termination. In some cases it is quite white, in others marked with red spots, and it is now and then uniformly of a dark colour, and sometimes even black. Some have thought this membrane possessed a vascular, others, a fibrous structure; the former opinion appears erroneous, and the latter is not confirmed by general observation.

Of the Remote Causes of the Cynanche Trachealis.

Little can be said with certainty concerning the causes of the croup, which is not surprising, since it is only lately that it has demanded much of the attention of practitioners. The chief subjects of this complaint are children from the time they are weaned till about twelve or thirteen years of age. After they are weaned, the younger they are the more they are subject to it. Some have thought it most common in marshy countries and near the coast.

It is very generally agreed that the croup is not contagious, but many believe it to be hereditary.

As in other particulars, it agrees with the phlegmasiæ in being most apt to attack those who have already laboured under it. It is an observation, however, which I have heard made by more than one practitioner, that after the first attack the disease generally appears in a milder form.*

The chief exciting cause of the croup seems to be the application of cold. It is more frequent in winter and spring than at other seasons, and seems particularly apt to arise from sudden changes in the weather. It is not improbable that certain states of the alimentary canal may assist in producing this complaint. Underwood, in his *Treatise on the Diseases of Children*, observes, that the change from milk to food of harder digestion is probably sometimes the cause of the croup. The same author alleges that it may be occasioned by bad fevers or chronic complaints that greatly reduce the strength.

The acute asthma resembles the croup in its causes as well as its symptoms, the same age predisposes to both, and the application of cold seems the chief exciting cause of both. Among the exciting causes of acute asthma, Dr. Millar, with great probabi-

* See Dr. Alexander's *Treatise on the Croup*.

lity, ranks a laxity of the solids, indigestible ingredients in the food, and a morbid weakness of the digestive organs.

Of the Proximate Cause of the Cynanche Trachealis.

It is necessary to say something of the different opinions which have prevailed respecting the nature of this complaint.

With regard to that which refers its seat to the lungs and attributes it to an inflammation of this viscus, it will readily be admitted to deserve no attention.

The first probable opinion suggested on this subject was that proposed by Dr. Home. He believed the first seat of the disease to be in the mucous glands of the trachea, which he supposes are excited to pour out an unusual quantity of mucus. "When there happens," he observes, "a very great secretion of this coagulable fluid from the glands of the trachea in children, they are either not sufficiently attentive or too young to spit it up. The thinner parts are carried off during expiration, while the remainder is thickened and compressed by the obstruction which the narrowness of the glottis opposes to the exit of the air from a larger canal. Every circumstance, he continues, encourages its concretion into a solid firm membrane, while the more internal parts of the mucus continue still fluid, and the continual secretion of more keeps it separated from the parts below."

But Dr. Home explains the conversion of this mucus into pus by experiments of Sir John Pringle, the inaccuracy of which I have already had occasion to notice. We have seen besides, that the membrane may be formed without occasioning symptoms of croup; which on the other hand may exist without the formation of any membrane.

Dr. Rush of Philadelphia, in a letter to Dr. Millar, published in 1770, takes a very opposite view of the subject; so far from agreeing with Dr. Home in supposing the preternatural membrane to be the cause of all the symptoms, he regards it merely as an adventitious circumstance supervening after the disease has lasted for some time. The disease he considers merely as a spasmodic affection. But it appears, from what was said above, that Dr. Rush did not at first properly distinguish the acute asthma and croup.

Michaelis has attempted to point out the difference in the nature of these complaints; his opinion of the former nearly corresponds with that of Dr. Rush: with respect to the croup he agrees with Dr. Home in regarding the preternatural membrane as the cause of all the symptoms; but this membrane, instead of being concreted mucus, is composed, he maintains, of lymph, and is of precisely the same nature with the polypous concretions found

in the heart and large blood-vessels. This opinion the author supports at considerable length and with a variety of arguments, for which I shall refer the reader to his work, and concludes with the following observations. These circumstances being granted, none can hesitate in ranking the preternatural membrane among the true polypi. It consists of the same matter, has the same figure, and with respect to its being thinner and less compact than polypi generally are, this is to be considered as a matter of small moment; nor indeed is the difference constant, nor does it seem of more weight than that polypi are sometimes solid and sometimes hollow.

But admitting this membrane to be wholly composed of lymph, from the different circumstances attending its formation and that of polypi, and the difference of the situations in which they are placed, we cannot class them together as affections of the same nature. Besides, if all that Michaelis says of the concretion were admitted, there would still be the same objections to his opinion as to Dr. Home's. Why has this membrane existed without occasioning symptoms of croup? Why have these symptoms been observed where no membrane was found?

Dr. Cullen's opinion of this complaint was different from any of those mentioned, as the reader will infer indeed from what has already been said. He regards it as consisting of an inflammation in the larynx, combined with a spasmodic constriction of the glottis. "Though this disease," he "observes, manifestly consists in an inflammatory affection, it does not commonly end either in suppuration or gangrene. The peculiar and troublesome circumstance of the disease seems to consist in a spasm of the muscles of the glottis, which, by inducing a suffocation, prevents the common consequences of inflammation. When this disease terminates in health it is by a resolution of the inflammation, by a ceasing of the spasm of the glottis, by an expectoration of the matter exuding from the trachea and of the crusts formed there. And frequently it ends without any expectoration or at least with such only as attends an ordinary catarrh."

To this opinion, by far the most probable, some objections might still be found. Why does the disease chiefly attack children? What proof is there of the spasm of the glottis? Dr. Cullen indeed grants that suffocation sometimes happens in consequence of the obstruction occasioned by the matter collected in the trachea and its branches. But the strongest objection to Dr. Cullen's opinion is, that traces of inflammation are not always found in the trachea of those who die of this complaint. It is far from being improbable, however, that although the cynanche trachealis consists in an inflammation of the trachea, the patient may die after the inflammation is gone, the effusion which relieves the inflammation being so copious as to occasion suffocation.

Of the Treatment of the Cynanche Trachealis.

It is unnecessary to give the treatment of the cynanche trachealis of adults and that of the croup separately ; we have every reason to believe them the same complaint, and whether they are or not, experience has assured us that the mode of treatment in them is the same.

The observations made on the treatment of the phlegmasiæ in general still apply. It will only be necessary therefore to make such additional observations as particularly respect this complaint.

If we consider the acute asthma and croup as the same complaint, the opinion of practitioners concerning the principal means employed are so contradictory that we shall find ourselves much at a loss how to proceed. "In the inflammatory state," Dr. Home observes, "bleeding appears to have been attended with immediate good effects and to be a powerful remedy in this situation. This ought to be done expeditiously and plentifully while the pulse will allow it. It is best to take it at first, with the lancet so that a sufficient quantity may soon be drawn off." Dr. Cullen and many others agree with Dr. Home in the advantages to be expected from blood-letting. Of all the remedies employed in this complaint, Michaelis observes, blood-letting holds unquestionably the first place. It diminishes the inflammation, which if we succeed in removing, we entirely remove the complaint. Dr. Ritty on the other hand observes. "I have tried evacuations of all kinds ; frequent bleeding and severe blistering were of no service." And with him Dr. Rush, in his first publication, and Dr. Millar agree. It is difficult to discover, says Dr. Crawford, in his Thesis de Cynanche Stridula, in what cases Dr. Millar judged venesection proper. But it is impossible for us to read the works of these writers and believe that they are speaking of the same disease. The very different effects which they experienced from the same remedies might alone induce us to believe them of a different nature. The chief point to be determined is, since these complaints are different and require very different modes of treatment, how shall we ascertain the remedies to which we shall have recourse, the diagnosis between them being so imperfect ? Experience has pointed out that an indiscriminate use of the lancet in all cases which have been regarded as croup is inadmissible, but it has not yet pointed out with precision the means of distinguishing the cases in which it is useful.

Without attending to the imperfect diagnosis we possess between these cases, on comparing together the observations of those who have been most conversant with the diseases we shall find, that whether the complaint be croup or acute asthma we may be guided in the employment of venesection by the state of the pulse, for if it be hard, venesection will be found useful in both.

In the true croup, when the pulse becomes soft and weak, which it does after the complaint has lasted for some time, blood-letting, on which we chiefly rely at an early period, is no longer proper. "But when the membrane is once formed," Dr. Home observes, "or the purulent matter collected in great quantity in the lungs, evacuations can be no longer of any use; they rather hurt as the pulse is then weak. Hence the reason why people differ about the effects of evacuations in this disease; some deeming them the only certain remedy, while others hold them to be destructive."

In the acute asthma, on the other hand, where evacuations are generally hurtful, if the pulse be strong and hard they are found beneficial. There can be little doubt, I think, of the complaint described by Mr Russel, in his *Economy of Nature*, under the name *Angina Inflammatoria Infantum*, being the acute asthma. Yet he observed an abatement of the alarming symptoms after blood-letting. Dr. Rush also observes, that blood-letting relieves the acute asthma when it is accompanied with pneumonic symptoms, but that when these symptoms do not appear, evacuations always do harm. In the cases described by Drs. Millar, Molloy, and Rutty, in which blood-letting was always prejudicial, the pulse was either natural or such as would deter from blood-letting in the croup itself.

By the state of the pulse, then, we are led constantly to employ blood-letting at the commencement of the true croup, but not after it has lasted for some time, and we have reason to believe that what Dr. Home calls the purulent state has commenced; we are led to employ it very rarely in the acute asthma, but sometimes here also, proportioning the extent of the evacuation to the strength of the patient and the hardness of the pulse.

While we are thus guided by the state of the pulse, we ought at the same time to attend to every circumstance tending to establish a diagnosis between the complaints; an attention to which will confirm the judgment we form from the state of the pulse.

After the propriety of blood-letting has been determined upon, the next point to be considered is, to what extent it should be carried. Here we are influenced by a variety of circumstances, which I more than once have had occasion to enumerate, the state of the pulse, habit of body, age of the patient, &c. Dr. Home ordered no less than five ounces to be taken from a child of fifteen months labouring under the croup. The pulse still remaining hard, he ordered a repetition of the blood-letting to the same extent on the same day. On the following day he ordered the child to be bled largely with leeches, and these repeated evacuations were followed by the best effects. We seldom, however, find it necessary to carry blood-letting as far as this. It has

been proposed in this, as in similar affections, to let blood from the jugular vein, and when it can readily be opened, it is the best.

With regard to purging in the croup, if we employ it with a view to diminish the inflammatory diathesis, the observations made respecting blood-letting are nearly applicable to it. With this view, however, there is no occasion to employ cathartics; blood-letting answers the purpose much better. We employ cathartics then only with a view of evacuating the intestines, and for this purpose the gentlest are the best. Dr. Rush particularly recommends calomel in the croup, and thinks it possessed of some specific power independently of the evacuation it occasions.—The bark, he says, is hardly a more certain remedy in intermittents, than calomel in the croup, if a large dose be given at the commencement of the complaint and small doses continued throughout its course. I have already had occasion to notice the effects of mercury in allaying inflammatory affections. It is probable that it may be of service in the croup, though not in the degree in which Dr. Rush alleges.

There has been some difference of opinion concerning the propriety of employing emetics in this complaint. Dr. Home objects to them, chiefly however from theoretical reasons; and those who have employed them, think themselves warranted to form a very different opinion of them. They are employed in the croup with a double view. At an early period, with the hopes of cutting short the disease; in a more advanced stage, with the hopes of expelling the preternatural membrane, which during their operation is often spit up. The reader will find cases in which this happened related by Michaelis.

There is no author, however, who gives so favourable a testimony of the effects of emetics in the croup as Dr. Crawford. In that part of Scotland, called the Carse of Gowrie, he observes, where the croup is very frequent, the constant practice is to give an emetic at the commencement of the complaint, even before the employment of blood-letting or cathartics, and this practice is not only safe but very successful. Few infants die of this disease, he remarks, when a timely emetic has been exhibited.

It is generally judged proper, however, to begin with blood-letting, by which a double advantage is gained. We both take the earliest opportunity of employing the remedy on which we most rely, and lessen the chance of the emetic occasioning too great a determination of blood to the head, which is to be avoided in all inflammations situated in the head or its immediate neighbourhood.

There is also much difference of opinion respecting the use of diaphoretics in the croup; and the advantage derived from them seems more doubtful. Almost all authors however recommend

the pediluvium. It is common with nurses, in many parts of Scotland where the disease is frequent, to immerse the whole body in warm water as soon as the complaint shews itself, which sometimes, it is said, wholly removes it. The acetate of ammonia, and a variety of other diaphoretics, recommended by authors, seem to be of little use. Next to the warm bath, nauseating doses of emetics appear to be the most useful diaphoretics in the croup, and these we shall find are useful in another way.

In the complaint described by Dr. Rutty and Dr. Molloy, which appears to be nearly the same as that described by Dr. Millar, diaphoretics were the medicines chiefly relied on. Dr. Molloy observes indeed, that those only recovered in whom he succeeded in bringing out a sweat.

The opinions of authors respecting blood-letting in the complaints which have been called the croup, are not more different than those respecting antispasmodics. It would appear on comparing a variety of observations, that the more the complaint approaches to the acute asthma, properly so called, the more beneficial they are. In the well formed croup they seem to be quite useless. "Though we suppose," Dr. Cullen observes, "that a spasm affecting the glottis is often fatal in this disease I have not found antispasmodic medicines to be of any use." Dr. Millar, on the other hand, Dr. Rush and others, in the acute asthma found antispasmodics the most successful medicines. Dr. Millar chiefly employed musk and asafœtida, and after repeated trials he informs us that he was taught chiefly to confide in asafœtida, very large quantities of which he found necessary. "An ounce of this gum," he observes, has "sometimes been taken by a child of eighteen months in the space of forty-eight hours, and almost as much at the same time injected by clysters, allowance being made for the residue of the gum which is lost in making the solution."

Some of the remedies termed expectorants are useful in the croup. I have already had occasion to mention nauseating doses. Opiates after the symptoms are allayed by blood-letting are often serviceable. They allay the cough and render the matter to be expectorated thicker and the expectoration more easy. Gum ammoniac and squills have been recommended, but in the inflammatory stage they are too irritating and afterwards they seem useless.

While the inflammatory symptoms continue, the diet should be very diluent and strictly antiphlogistic. It may be useful when the symptoms run high to abstain from food of every kind for the first twenty-four hours. Nitre is a good addition to the drink.

As this complaint generally leaves the patient much reduced, the bark is often necessary to restore the strength, but in the

true croup we must be cautious not to administer it till after every appearance of inflammation has subsided. It is then the means of preventing a relapse ; given earlier it might occasion it. The bark may be given more early in the acute asthma. It is particularly serviceable in this complaint during the remissions.*

The observations on the use of digitalis and other means to diminish the force of the circulation, made when we were considering the phlegmasiæ in general, are applicable here.

Such are the remedies acting on the system in general to which we have recourse in the croup and acute asthma ; it remains for us to consider the local means used in these complaints, which form a very essential part of their treatment.

The most powerful of the local, as of the general means employed in the croup, is blood-letting. After general blood-letting has been carried as far as the age and habit of the patient will permit, if the symptoms are still considerable, especially if the pulse be hard, it is proper to draw blood from the external fauces. After proper evacuations, there are few remedies more beneficial in the croup than blisters. Dr. Home observes, that blisters applied round the neck after the vessels were well emptied, were of great service, but of none, he adds, when applied before this. The chief thing to be observed in their application is, that it should be made as near the part affected as possible.

Blisters do not seem to be so serviceable in the acute asthma as in the true croup. Dr. Molloy tells us that their application was attended with no advantage whatever in the cases he saw. Dr. Millar however thinks a blister applied between the shoulders a means of preventing the recurrence of the paroxysm.

Rubefacients have not been much recommended in the croup. Dr. Millar found them useful applied to the extremities in the acute asthma.

There is perhaps no other form of cynanche in which breathing the steams of vinegar and water is so beneficial as in the croup. In whatever manner it acts, whether by mixing with and diluting the thick matter which clogs the bronchial vessels, or as a stimulus acting on these parts and increasing the secretion from them, it is found to loosen the cough, to promote expectoration, and relieve the dyspnoea. Some recommend applying the steams of water externally to the neck. Much however is not to be expected from this. Blistering is certainly more beneficial, and both cannot well be employed.

From the vicinity of the trachea and fauces, many recommend swallowing from time to time some emollient fluid, olive

* See the observations of Dr. Millar, Mr. Russel, and others.

oil or oil of sweet almonds, or what is preferable, because it loads the stomach less. mucilage of gum arabic. I have seen considerable relief obtained by such means. If small doses however do not succeed, we are not to expect much advantage from larger ones, and every thing of this kind tends to load the stomach.

Dr. Thornton, in his Guide to Health, has proposed a remedy, from which, a priori, we should be inclined to expect some advantage, a certain proportion of azotic gas mixed with the air which the patient breathes. This, it is said, has produced very sudden and beneficial effects.

When none of the means we have been considering prove successful ; when the symptoms particularly the dyspnœa which is that we chiefly dread, increase ; the only chance of relief which remains to the patient is by bronchotomy, by making an opening from the anterior part of the neck into the trachea. This operation is in fact less formidable than it appears, and if carefully performed is generally safe. Dr. Home saw the propriety of it in the worst cases of croup, and was the first who proposed it as a last resource. Michaelis is a bolder practitioner and recommends it in all cases where the symptoms do not yield readily to other means. He gives the arguments for and against it at considerable length, for which I must refer to his Treatise. In avoiding the vulgar prejudices against this operation, Michaelis runs perhaps to the opposite extreme, and considers it more trivial than it really is. One caution given by Dr. Crawford is not to be overlooked, namely, that while we are endeavouring to extract the preternatural membrane, both the artificial passage we have made for the admission of the air, and the passage by the glottis may be so obstructed that the patient may be suffocated before the membrane is got out. In the convulsive asthma this membrane is at least not often formed. Here therefore, bronchotomy will bring more immediate relief with less danger.

After we have succeeded in removing the symptoms of the croup, some attention is requisite to prevent their return. I have already observed, that, as it often leaves the habit much weakened, the bark is necessary ; and after the strength is in some measure restored, the cold bath is often useful ; at first, however, it must be used with caution, especially in those of a delicate constitution.

The benefit to be derived from the cold bath in this, as well as other cases, may be judged of by the feelings of the patient after he comes out of it. If a glow of heat succeeds it and the spirits and appetite are improved, it will be found a powerful means of restoring impaired vigour. If, on the contrary, its use is followed by languor, drowsiness, depression of spirits, a degree of chilliness, and want of appetite, it will rather increase than lessen the debility.

It will also be necessary for some time to pay attention to diet. Whatever occasions acidity and flatulence must be carefully avoided, and the state of the bowels particularly attended to. Most of the complaints of children are more or less influenced by the state of the primæ viæ.

In speaking of the means of preventing a relapse, it is almost unnecessary to observe, that the occasional causes of the complaint above pointed out are to be guarded against with care.*

CHAP. X.

Of Pneumonia.

PNEUMONIA is Dr. Cullen's eleventh genus. It is defined by him,

Fever, pain in some part of the chest, dyspnœa, cough.†

He divides it into two species, the peripneumonia and pleuritis. The propriety of which division we shall soon have occasion to consider.

SECT. I.

Of the Symptoms of Pneumonia.

THE first sense of uneasiness referred to the thorax in this

* Dr. Home is generally supposed in this country to have been the first who distinguished the croup. But it appears from the observations of Michaelis and other foreign writers, that this complaint was known in many parts of the Continent long before his account of it was published. And even in our own country it was accurately described in a paper by Dr. Starr in 1749, published in the Philosophical Transactions for 1750. Dr. Starr's account is in some respects confused; from the cynanche maligna in many of the cases he saw having been complicated with the affection of the larynx. But he has not only given a good account of the croupy symptoms, but a drawing of the membrane which had lined the whole of the trachea and part of the larger branches of the bronchiæ. Dr. Home, however, may still be regarded as the first person in this country who had any accurate idea of the complaint, for Dr. Starr made no dissections, and understood its nature so little, that he believed the preternatural membrane which he saw coughed up to be the internal coat of the trachea and its branches; although, indeed, in one part of his paper he observes, that were the trachea laid open, he believes it would be found to be lined with a morbid secretion. Since the time of Dr. Home this complaint has been treated of by a variety of authors, the chief of whom I have had occasion to mention.

† "Pyrexia dolor in quadam thoracis parte respiratio difficilis, tussis."

complaint and the cough are sometimes so slight as to be almost overlooked, or regarded as nothing more than such as in a greater or less degree attend most fevers, so that for some time the patient is believed to labour under nothing more than common fever; he is affected with shivering often alternating with fits of heat. he complains of thirst and anxiety, the breathing is hurried or laborious, the pulse more frequent than natural, and the temperature increased.

Pneumonia generally makes its attack, however, in a less ambiguous way. A severe pain and cough, with much difficulty of breathing, and a strong, hard, and frequent pulse, are often the first symptoms. When the pain and a degree of dyspnœa arising from it, continue for any length of time without cough and fever, the disease, we shall find, is to be regarded as different from the true pneumonia.

Such in fact, is an enumeration of all the symptoms of pneumonia, which are much less complicated than those of many of the foregoing diseases. In considering each of these symptoms separately, we shall find them vary considerably in different cases.

The dyspnœa, the most constant symptom of pneumonia, is in some instances not more considerable, it has just been observed, than that which frequently accompanies simple fever; this is true, however, only of the commencement of the disease, for in all cases as it advances the breathing becomes more difficult, it is often short and frequent, the violence of the pain preventing a full inspiration; in other cases, where the pain is either dull or absent, it is oppressed and laborious, accompanied with anxiety and a sense of weight about the præcordia.

The dyspnœa is greatest during inspiration, and generally more so when the patient is in some particular posture. Sometimes it is greatest when he lies on the side affected, sometimes when on the other, and in many cases he can lie on neither, finding ease only when lying on the back or breast. and very often the erect posture is necessary; when the inflammation is considerable, the breath is sensibly hotter than usual.

The most remarkable symptom of pneumonia is the pain which, in different cases, has its seat in all the different parts of the thorax. But its most frequent seat is about the sixth or seventh rib, near the middle or rather more forwards.

It is a belief among the vulgar that the pain in pneumonia is always in the left side; nor are such errors confined to the vulgar, even many professional men never regard the case as pneumonia unless the pain be in the side. It is, however, very frequently under the sternum, the clavicles, the spine, or the scapulæ. It has been an opinion maintained by the best informed, that in-

stead of the left, pneumonia attacks the right side most frequently. This observation is made both by Van Swieten and Triller,* the latter observing, however, that in the right side it is least dangerous. All such observations seem founded on a partial view of the subject. It has been observed, says Wendt,† that when the pain in pneumonia occupies the left side, the danger is greater than when it is confined to the right. I have not, however, found this to be the case, and the number of my patients who died of this complaint in the right side is only greater by one than that of those who died of it in the left.

The pain, like the difficulty of breathing, is most felt in particular postures, which are different in different cases. In most cases it is fixed, sometimes it shoots in various directions, sometimes it only shifts its place, and a change of place from the sides to the clavicles or scapulæ has been regarded as a favourable symptom. But Wendt justly observes, that we can make no other inference from it, but that the complaint has changed its seat; I have more frequently, he observes, known a pain of the arms to supervene in pneumonia, and this I have always found salutary.

The kind and degree of the pain is not less various than its seat. Sometimes it is exquisitely acute, and during inspiration almost intolerable, only differing in its greater severity from the rheumatic affection called a stitch in the side. At other times it is a more general obtuse pain, and in some cases rather a sense of weight than of pain. Sometimes it is only felt when the patient lies on the right or left side and makes a full inspiration or coughs; this case has been termed the pleuritis occulta, because the pain is only felt by an effort. In some instances however, it is not felt at all, and the practitioner is left to discover the nature of the disease by an attention to the other symptoms. There is so little alarming in the appearance of such cases, the patient being only affected with more or less cough, considerable difficulty of breathing, which often prevents his lying down, with a greater or less degree of fever, that the assistance of the physician is frequently not called in till it can be of no service.

It is chiefly the different seat, kind, and degree of the pain, which has given rise to the ill-founded division of pneumonia into pleurisy or inflammation of the membranes, and peripneumony or inflammation of the substance of the lungs, paraphrenitis or inflammation of that part of the pleura which lines the diaphragm, pericarditis or inflammation of the pericardium, inflammation of the mediastinum, &c.

Cough is a very constant attendant on all inflammations of the

* Triller de Pleuritude.

† Wendt de Pleuritude, in Sandefort's Thesaurus.

thoracic viscera, and when the pain is severe it is one of the most troublesome of their symptoms. In some cases it is dry, in others attended with an expectoration; and although dry at the commencement of the disease it rarely continues so during its progress. The absence of the spitting has given rise to a division of pleurisy into dry and humoral, which is as old as the days of Hippocrates.

The appearance and consistence of the matter spit up varies much in different cases. At the commencement of the complaint it is generally thin, becoming thicker during its progress. Much of the prognosis may be gathered from the kind of cough and the matter spit up. Celsus observes, that when there is no expectoration, the prognosis is bad, but worse when the expectoration is bloody; the truth of the latter part of this observation experience has since called in question, and although a spitting of much frothy blood is always an alarming symptom,* it is now generally admitted that the matter spit up being tinged with blood, if less favourable than an expectoration without blood, which is doubted, affords a much better prognosis than no expectoration at all. The matter spit up being greenish, of a dark brown colour, or very thin and acrid, so as to excoriate the wind-pipe, or sanious and fetid, is very unfavourable. A copious white or yellowish expectoration of a pretty thick consistence, is the most favourable. It may however be too thick and viscid, as well as too thin. The viscid globular sputa, says Huxham, are bad; and Bianchus observes, in his *Historia Hepatica*, that we cannot always draw a favourable prognosis from the expectorated matter being copious and thick, but, on the contrary, that a very viscid expectoration, gradually becoming more so, often portends a fatal termination. It is an observation handed down from Hippocrates, that if there be much rattling in the breast before the matter about to be spit up is expectorated, the prognosis is bad.

Upon the whole it may be observed, that the more copious,† free, and bland the expectoration becomes, and the greater the relief it brings, the better is the prognosis. Every spitting, Wendt observes, which relieves the pain and renders the breathing freer must be regarded as favourable, let the colour of the matter be what it may, green, livid, or even black. If, on the other hand, the expectoration has been scanty or wholly absent from the beginning of the complaint, and still more if it fails during its progress, if the matter be expectorated with difficulty and little relief is obtained, we dread suppuration or gangrene. There is a

* When much blood is poured into the lungs, says Huxham, part often stagnates there and does much harm, producing sanious sputa and sometimes mortification.

† Schroeder justly observes, that when the expectoration is livid and sanious, the more copious it is, the worse is the prognosis. Schroeder de Pleuritidum partitione, in his *Opusc. Med.*

peculiar kind of **spitting**, noticed by many of the writers on this complaint, which is far from favourable, of a thin yellow matter, which has been termed a bilious spitting, and thought by some to characterize what has been called the bilious pneumonia, of which I shall frequently have occasion to speak more particularly.

Suppuration is chiefly to be dreaded when the expectoration is scanty or wholly absent ; gangrene when the matter coughed up is livid and sanious.

The spitting has been regarded as a diagnostic between peripneumony and pleuritis, that is, between inflammation of the substance of the lungs and that of their membranes ; but we shall find this diagnostic as fallacious as others. Nothing can be more inconsistent than the observations of authors on this head. Dr. Cullen, in his definition of pleuritis, observes, that the cough, although at first dry, becomes moist and sometimes bloody.—Wendt, who is very conversant with this disease, remarks that when a patient labouring under pleuritis begins to spit, he no longer regards the complaint as a simple pleuritis, but a combination of pleuritis and peripneumony. Sydenham, on the other hand, speaks of expectoration as a constant symptom in the true pleurisy.

Such are the local symptoms of pneumonia and their principal varieties ; but no combination of these constitutes pneumonia without the presence of fever. The fever, it is observed above, often shews itself as early as any of the local symptoms, and the latter are never present for any length of time without being attended by the former. If we except the difficulty of breathing and some degree of cough, we shall find no symptom of pneumonia so constant as a frequent pulse.

At the commencement the pulse is generally such as in most of the phlegmasiæ, strong, hard, and frequent. Several authors have observed that the pulse in pneumonia is often different on different sides of the body. Zimmerman gives a case in illustration of this ; and Cleghorn says it is often most obscure on the side affected. It was observed of simple fever, that the pulse is sometimes oppressed at the beginning, and rises on blood-letting ; the same has been frequently remarked of pneumonia.—The pulse, says Huxham, at the very beginning is sometimes obscure, oppressed, irregular, and intermitting, accompanied with great prostration of strength. If these symptoms, he remarks, appear in a person of a good habit and unimpaired vigour, they often proceed from the vessels being overloaded ; and the pulse and strength rise on blood-letting. But there is a species of pneumonia which comes on with a depressed pulse that sinks on blood-letting, which I shall soon have occasion to notice more particularly.

Soon after the commencement of the disease the face becomes flushed, the skin hot and dry, the urine sometimes quite limpid and in large quantity, which has ever since the days of Hippocrates been regarded as an unfavourable symptom; at other times scanty and high coloured.

The bowels are seldom regular, but either costive or too much relaxed. The thirst is considerable, and the tongue generally dry, white, and rough. In short all the symptoms of synocha are superadded to the foregoing.

Idiopathic pneumonia agrees with other phlegmasiæ in not being often attended with delirium or coma, if, according to Boerhaave, we except those cases which are terminating by suppuration. Even in these indeed they are far from being frequent symptoms. When pneumonia is attended with delirium, we generally find that the former is not the primary disease.

Such are the symptoms attending the commencement and progress of pneumonia. It remains for us to consider its different terminations, and the symptoms which indicate its tendency to them, by an attention to which the prognosis at the various periods of the disease is ascertained.

Resolution is the only termination of pneumonia which deserves the name of favourable, for few recover after suppuration has taken place. Resolution is generally attended with some sensible evacuation. It has already been remarked that nothing is more salutary than a copious and free expectoration whether streaked or not with blood.

It is certainly in some measure a contradiction in terms to say that the termination is by resolution when the matter expectorated is evidently purulent. It has long been taken for granted that the formation of pus is always attended with the destruction of the soft parts, so that suppuration implies not only the formation of pus, but also the cavity or ulceration which it frequently occasions. But now that we are well assured that the formation of pus may take place without either abscess or ulceration, it is necessary to have some term expressive of its formation without these accidents. If the term suppuration is used in this sense, the termination I am speaking of certainly often deserves the name.

It has puzzled many Physiologists to account for the formation of pus in such cases, for it has even been found after death in the bronchiæ, where it was impossible to trace any marks of ulceration. De Haen supposed the pus in these instances to be formed in the blood, and poured out by the exhalents. Dr. Cullen accounts for its presence by some conclusions of Sir John Pringle, which, we have seen, are far from being accurate.* The experi-

* Introduction to the 2d Part.

ments of Mr. Home, demonstrating how readily pus is formed by inflamed secreting surfaces, throw more light on its formation in the present case.

If we except a copious expectoration, there is no evacuation which more frequently attends a favourable termination of pneumonia than a flow of sweat; any degree of general moisture appearing on the skin in pneumonia is favourable; a sweat seldom fails to bring relief, and if it be universal and copious often carries off the disease. But Wendt observes, that if the symptoms do not soon remit, the sweat often proves fruitless or even hurtful. Much sweating, says Quarin, which does not relieve the symptoms, is dangerous. And Huxham remarks, that the fluid which the patient drinks, running off quickly by any of the excretories, even by profuse sweating, has ever since the days of Hippocrates been regarded as unfavourable.

An hemorrhagy from the nose often brings relief. Hoffman considers it most salutary when it occurs about the fourth day, but it proves beneficial much earlier and later than this period; it seldom, however, produces a perfect crisis. The appearance of the hemorrhoids also, though less frequently, promotes the resolution of pneumonia. Many reckon blood in the sputa favourable, so that moderate hæmoptysis may perhaps be ranked among the critical hemorrhagies in this complaint.

The appearance of the miliary eruption is favourable when not forced out by the heating regimen, particularly, Allionius* observes, when the complaint has arisen from cold.

High coloured turbid urine, depositing a copious sediment, frequently, but not always as some allege, accompanies the resolution of pneumonia.

Although diarrhœa sometimes brings relief, particularly, says Schroeder, at an advanced period, it less frequently does so than any other evacuation which has been mentioned, and is upon the whole, particularly at an early period, to be regarded as unfavourable, except there be bile or other irritating matter in the bowels.† Whatever oppresses the bowels is particularly hurtful in pneumonia. Symptoms of indigestion, especially much flatulence, are unfavourable. In such cases, Schroeder observes, a spontaneous vomiting is often critical.

The discharge occasioned by catarrh is also unfavourable.—This case is termed by Huxham the catarrhal pneumonia, and he regards the prognosis in it as very bad.

I have already had occasion to observe, that the phlegmasiæ are sometimes terminated by what is called metastasis, that is,

* De Febre Miliare.

† Quarin de Feb.

by the inflammation changing its seat. Thus pneumonia is sometimes terminated by an inflammation and suppuration of the parotid glands, or by the appearance of an erysipelatous inflammation on the surface. Inflamed swellings, says Quarin, sometimes appear behind the ears, or on the legs, or other parts, and prove critical in pneumonia. Huxham and others make similar observations.

But it is evident that every metastasis is not favourable, the inflammation may seize on a part equally or more vital than that it first occupied ; this, however, rarely happens in pneumonia. The liver and spleen are the viscera most frequently attacked in metastasis of pneumonia.

A short time before any of the favourable terminations just mentioned, a general remission of the symptoms can, for the most part, be perceived.

The unfavourable terminations of pneumonia are, the formation of an abscess or suppuration with ulceration, and gangrene, which it has in common with the other phlegmasiæ, and certain terminations peculiar to itself.

We have reason to suppose that suppuration will take place, if those of resolution do not shew themselves within four or five days, if there be either no spitting or such as brings no relief, if the symptoms have not yielded to blood-letting and proper medicines, but without being violent continue obstinate, especially if delirium with rather a soft undulating pulse supervene.

That suppuration has actually begun we know from frequent slight irregular shiverings following the symptoms just enumerated without any manifest cause ; from the pain being mitigated or removed while the dyspnœa continues ; from the pulse becoming fuller, softer, and either slower or more frequent ; from the cheeks and lips looking red ; and from an increase of thirst and fever in the evening.

We have reason to believe that a collection of matter, which in the lungs is termed a vomica, is formed, when after the above symptoms there is an obstinate dry cough, the respiration being difficult, short, laborious, rattling, and more frequent than usual ; when the patient is able to lie only on the side affected ; when there is slight fever returning at intervals, particularly in the evenings, with redness of the cheeks and lips, the dyspnœa, cough, and fever being increased by eating and exercise ; when the thirst is considerable and there are sweats towards morning, especially about the throat and forehead, with turbid urine, a palid countenance, wasting of the body, and great debility. The peculiar fever which supervenes in such cases, and which is characterized by these symptoms, appears to be constantly symptomatic,

and generally, if not always, indicates an absorption of purulent matter.

When the abscess is situated in the most external part of the lungs immediately under the ribs, we may often perceive a soft swelling appearing between the ribs, and a fluctuation of the matter can sometimes be distinctly felt. But many of the foregoing symptoms are not essentially connected with the presence of a vomica. The rattling breathing often arises from part of the matter that should be expectorated adhering to the branches of the bronchiæ, the patient's strength being too much reduced to bring it up; nor does it always happen that he can only lie on the side affected, he can frequently lie on both without any inconvenience; and it is observed by many, that the shiverings which generally precede the formation of a vomica are often hardly to be perceived or wholly wanting; and as for the disease, Wendt observes, being long protracted and some of the symptoms abating, this must be regarded as one of the least certain signs of suppuration having taken place.

Upon the whole, however, the ceasing of the pain, or the pain being changed into a sense of weight, without any of the evacuations, which it was observed above frequently attend resolution,* while the cough, dyspnœa, and fever still continue, the pulse losing entirely its hardness, and the fever assuming the form of hectic, leave no room to doubt the presence of an abscess in the lungs. About the seventh day, not the fourth as some have alleged, is the period at which, if the complaint has continued without any remarkable remission, we may suspect that suppuration is taking place; even in such cases indeed resolution has taken place as late as the eleventh or twelfth day; but this is rare with regard to the cases in which there are remissions, these may terminate by resolution after a much longer time. Dr. Cullen remarks, that resolution seldom happens in any case after the fourteenth day; I have known it happen, however, after the complaint had lasted four or five weeks.

Except a vomica be situated on the surface of the lungs so that the fluctuation may be felt externally, in which case the matter may be discharged by an opening made through the intercostal muscles, it generally proves fatal. There are four ways in which a vomica may prove fatal. Without bursting it often occasions hectic fever, which gradually exhausts the strength. Abscesses of the lungs, however, when their sides have become so callous as to prevent absorption, have remained for many years, without producing fever or otherwise impairing health. When the abscess is large and bursts into the substance of the lungs, it often produces instant suffocation. When the matter is discharged into the cavity of the thorax, there is formed what has

* Dr. Millar's Treatise on the Diseases of Great-Britain.

been termed an empyema ; the matter falls down upon the diaphragm when the patient is in the erect posture, occasioning a sense of weight in the lower part of the chest. The difficulty of breathing, (which is now greatly increased if the patient lies down, especially on the back) cough, and hectic fever continue, and gradually exhaust the strength. In the empyema the fluctuation of the matter may often be perceived in the cavity of the thorax.

A vomica may terminate fatally in a fourth way ; when it is small its bursting into the substance of the lungs does not occasion suffocation, but an expectoration of pus ; an ulcer of the lungs is generally the consequence, and phthisis succeeds, the symptoms of which we shall soon have occasion to consider. It has sometimes happened, however, in very healthy habits, especially in such as are free from any scrophulous tendency, that the ulcer formed by the bursting of a small abscess in the lungs has healed, and the patient has got well.

An abscess of the lungs sometimes, though rarely, terminates favourably in another way ; cases are alluded to by Quarin and others, in which the pus was absorbed and passed by urine or stool, and sometimes we have reason to believe it has been deposited in other parts of the body ; but these are occurrences so rare, that in forming the prognosis they are hardly to be taken into the account. Wendt observes, that when pneumonia terminates by suppuration, the abscess generally bursts before the twentieth day of the disease. Its bursting, however, is often delayed to a much later period.

The termination of pneumonia in gangrene, which is very rare, always proves fatal in a very short time. The tendency to gangrene is known from the general violence of the symptoms, and from their wholly resisting the usual remedies. When gangrene is about to take place there is a diminution of the pain, the cheeks become red, the pulse sinks, and the matter expectorated assumes an ichorous appearance. When the gangrene has actually taken place the pain ceases without any of the salutary evacuations above-mentioned, the countenance becomes pale, the pulse still more feeble and intermitting, cold clammy sweats appear on different parts of the body, hiccup, loss of sight, and general stupor supervene, and the patient soon expires. Dr. Cullen, however, justly observes, that the termination by gangrene is so conjoined with that by effusion, which I shall presently have occasion to consider, that their symptoms are hardly to be distinguished.

It is supposed by many that pneumonia may terminate in schirrus, which is known, according to Quarin, by great difficulty of breathing and a troublesome dry cough remaining after the other symptoms are gone, and much increased by exercise or a full

meal ; it is distinguished from a vomica by the absence of hectic fever, and the symptoms remaining in the same state for a great length of time, while in the vomica they generally grow worse.

In some cases, however, there seems to remain after pneumonia a difficulty of breathing and oppression, indicating no fixed complaint in the lungs, but mere debility ; this is most apt to happen in nervous irritable habits, and is best known by the absence of hectic fever.

The terminations peculiar to pneumonia are, an effusion of red blood or of a serous matter into the substance of the lungs, producing suffocation, or such an exudation from the pleura as occasions a true hydrothorax. When the effusion from the surface of the pleura is small, it forms the cement of those adhesions to the pleura, costalis and mediastinum, so constantly observed in those who have suffered even in the least degree from pneumonic inflammation, and indeed those adhesions arise from such slight causes, that few are wholly free from them. There is also frequently an exudation into the bronchiæ of a thickish serous fluid, which often accumulates in such quantity that it cannot be brought up, and occasions suffocation.

When any of the fatal terminations of pneumonia are about to take place, we can generally observe an evident increase of the whole, or part of the symptoms, the pain is often felt more generally throughout the thorax, the difficulty of breathing is increased, the patient becomes more watchful, or (which is much more rare) is affected with a degree of coma that rarely however becomes considerable. In some cases there is a degree of delirium. The matter expectorated is more mixed with blood or the expectoration ceases, either owing to the bronchiæ being clogged by the quantity of viscid fluid poured into them, or the increasing debility of the patient.

Upon the whole, the less difficult the breathing, the less severe the cough, the more copious and free the expectoration and the greater the relief it brings, the more regular and firm, and the less frequent and hard the pulse, and the less the strength is reduced, the better is the prognosis.

Pneumonia generally proves fatal before the seventh day, sometimes as early as the third ; but where death is occasioned by the bursting of a vomica it is commonly much later. Vomica, it is observed above, generally burst before the twentieth day, but if they are succeeded by an empyema or phthisis death may be delayed to a much later period.

There are few complaints whose diagnosis is easier than that of pneumonia, the only difficulty is to distinguish it from cases of symptomatic and false pleurisy. Yet there is no symptom in pneumonia which is not met with in other diseases. Few symp-

ptoms are more frequent than pain in some part of the chest, cough, more or less difficulty of breathing, and fever; but where these, or the three last of these, are combined, we are well assured of the presence of pneumonia. The diagnosis of this disease is easy because the symptoms which mark it are few and distinct.

Although we succeed in removing the symptoms of pneumonia, we have not removed the danger, for this disease is very frequently renewed, and the second attack is often more violent and almost always more dangerous than the first. Wendt even speaks of a recovery from such cases as rare, “non semper sunt lethales;” and Quarin remarks, “Pleuritis recidiva vix curanda.

SECT. II.

Of the Appearances on Dissection.

ON laying open the thorax, we often find in the substance of one or more of the lobes of the lungs a collection of a greenish yellow pus, sometimes mixed with blood, of a brown or dark red colour, and of a grumous appearance.* The same kind of matter is often found on the surface of the lungs or between the folds of the pleura, portions of the lungs and pleura are soft, and sometimes wholly dissolved in the purulent or sanious matter just mentioned. There are cases on record in which portions of the pleura were dissolved, the lungs being left entire; such cases are very rare, and Schroeder and others remark, that it is rare for the pleura to be affected with much inflammation without the lungs partaking of it.

When the inflamed pleura remains entire it is often covered with florid spots.

On examining the lungs more particularly we often find small lurking ulcers in the parenchyma and the branches of the bronchiæ; sometimes the lungs are indurated in different parts; and Cleghorn observes, that they are sometimes changed into a hard substance like liver, which sinks in water.

The bronchiæ frequently contain the same kind of matter which we meet with in the substance of the lungs and between the folds of the pleura.

The liquor of the pericardium is generally altered either in

* Wendt mentions a sack of blood found in the substance of the lungs after pneumonia, which was probably formed by extravasation during the disease.

quantity or quality. Sometimes it is much more copious than usual, sometimes wholly wanting, and the pericardium itself, (which like the pleura is now and then soft and partly dissolved) adheres to the heart throughout its whole extent. It seems to be this consequence of disease which has given rise to the opinion of the pericardium being sometimes wanting. The liquor of the pericardium is often tinged with blood, and in some cases wholly consists of a greenish purulent matter.

The heart itself, though not often, sometimes partakes of the morbid appearances. In cutting through its sides a small quantity of pus is found scattered here and there among its muscular fibres.

Polypous concretions are found in the heart and large blood vessels ; these, I have already had occasion to remark, seem to be formed in articulo mortis or immediately after death, and seem to be little connected with the disease of which the patient dies. The principal blood vessels of the chest are sometimes enlarged, and the blood in them, as well indeed as in every other part of the lungs, is generally of a very dark colour.

The lungs often appear considerably enlarged, apparently from their containing a greater than usual quantity of extravasated fluids. They are often covered with a soft whitish viscid crust, which frequently assumes a membranous form, and seems, as I have just had occasion to observe, to be the cement where adhesions between the folds of the pleura take place. There is no consequence of pneumonic inflammation so common as these adhesions, they must either be occasioned by inflammation so slight that it is not attended with the usual symptoms of pneumonia, or they must arise also from some other cause, for they are found in many who never laboured under this complaint.—Dr. Monro, in his Anatomical Lectures, observes, that he has examined the thorax of few adults without finding more or less of such adhesions. Some imagine that the adhesions left by pneumonia are a principal cause of the frequent recurrence of this complaint ; except when very extensive however, in which case they frequently occasion habitual dyspnoea, they do not seem to have much tendency of this kind. The frequent recurrence of pneumonia in those who have once laboured under it, is readily accounted for by the tendency to future attacks which all inflammations leave behind them, and the exposed situation of the lungs.

It is very common to meet with morbid appearances in the abdomen of those who die of pneumonia. The liver and pancreas are often found indurated, and the former enlarged. There is sometimes also induration of the spleen, and very frequently worms are found in the upper parts of the intestines, particularly in the jejunum. In a very large proportion of the cases mentioned by Wendt, limbrici were found in this intestine. The

reader will also see similar cases in the 21st Epistle of Morgagni de Sedibus et Causis Morborum.

The only morbid appearance usually found in the head is that of congestion, which the reader will find particularly noticed by Dr. Cleghorn and others.

SECT. III.

Of the Varieties of Pneumonia.

I HAVE already hinted that it is only lately that pneumonia has been regarded as one complaint. By the older writers, and by many even in our own days, particularly foreigners, it has been divided into a number of different diseases according to the place which the inflammation occupies. When it is seated in the substance of the lungs, the disease is termed peripneumonia; when in the pleura, pleuritis; in the diaphragm, paraphrenitis; in the heart, carditis; and even inflammations of the mediastinum and pericardium are regarded as distinct complaints. Certain combinations of these affections also have peculiar appellations; that of the inflammation of the substance of the lungs, for example, and their investing membranes, has been termed pleuroperipneumonia or peripneumopleuritis.

There is so strong and in some places so general a prepossession in favour of the foregoing divisions of pneumonia, that it will be necessary for me to consider at some length on what observations they are founded, and how far they can prove useful in practice.

The great division of pneumonia which falls first to be considered, is that into peripneumony and pleurisy.

Dr. Cullen, apparently more in compliance with the opinions of others than relying on his own judgment, has given this division a place in his Nosology. The former he defines pneumonia, with a pulse not always hard, sometimes soft, the pain dull, the respiration constantly difficult, and often only to be performed in the erect posture, the face swelled and purple, the cough generally moist, and the matter expectorated sometimes bloody. Other authors give a similar, though in some respects a different account of peripneumony. In the peripneumony, Hoffman observes, the inflammation is seated more deeply in the substance of the lungs, the pain is more dull and extends to the back and scapulæ, the breathing more laborious, and the pulse soft. The pulse, Dr. M'Bride observes, is less hard than in the pleurisy. Burserius gives a fuller account of the diagnostic symptoms of peripneumony than any other writer I have met with. It is attended, he observes, with such difficulty of breathing, that the pa-

ilent is in danger of suffocation, which often obliges him to sit as much as possible in the erect posture, the breathing is frequent, the breath very hot, the cough at first dry or with a very scanty expectoration, which is frothy, thin, crude, yellow, or mixed with blood; at a more advanced period becoming more considerable, thicker, better concocted, and more easily spit up. The patient complains of a weight, oppression, and distention throughout the whole chest, but there is no pain except such as can hardly be felt, confined chiefly to the region of the sternum and spine, and often only perceived when the breast is powerfully agitated by coughing. The cheeks are red and swelled, the eyes prominent, the head pained, the tongue parched, at first yellowish, afterwards covered with viscid mucus, at length black and chopped. These symptoms are accompanied with a great desire for cold drink and fresh air, a full and sometimes undulating soft pulse. Sometimes however, he observes, contrary to the assertions of most authors, the pulse is strong and hard;* at other times it is irregular and intermitting or very small and quick. The patient lies with more ease on the back than on the sides. The debility is very great. The urine is sometimes pale and clear, and at other times dark coloured and turbid. Many other accounts of peripneumony nearly in the same tenor might be adduced.

There are but two purposes which can possibly be served by thus separating from the other symptoms of pneumonia and calling by a particular appellation those just enumerated. It must either teach us to ascertain the seat of the disease with more accuracy, or enable us better to suit the modes of practice to the various symptoms of pneumonia. Let us consider how far it can answer either of those purposes.

In the first place, it may be remarked of the different accounts of peripneumony which have been quoted, that their authors are far from agreeing among themselves what its diagnostic symptoms are, and this is a point which must remain to be settled, although it may be found that some of the foregoing symptoms always indicate an inflammation of the parenchyma of the lungs, and demand a treatment different from that necessary in other cases of pneumonia.

However different the characters of peripneumony just quoted and others which might be quoted, they seem all to agree in this, that an obtuse and pretty general pain, or the total want of pain with a great degree of dyspnœa, are its chief characteristic marks, and on comparing these accounts together we shall find, that there is no other symptom generally regarded as characteristic of peripneumony.

A similar observation may be made respecting pleurisy.

* Haller mentions a case in which the strong hard pulse was very remarkable, yet it appeared on dissection that the lungs alone had been inflamed. *Opusc. Pathol.*

Were we to examine the different accounts of authors, we should find but very few symptoms which all agree in regarding as peculiar to this form of the complaint. Dr. Cullen says the cough is moist at certain periods of pleurisy. Wendt says it is always dry. The hard pulse and quick short breathing, supposed by Hoffman to characterize pleurisy, are mentioned by others as symptoms of peripneumony.

Upon the whole if we compare together the various accounts of pleurisy given by the writers who adopt this division of pneumonia, we shall find, that the acute pain is almost the only symptom regarded by all of them as characteristic of this form of it.

It is first to be considered then, whether the dyspnœa being very considerable and the pain either dull or absent, indicate that the inflammation is confined to the parenchyma, and the dyspnœa being less urgent but the pain more acute, that it has its seat in the membranes of the lungs. If the reader will consult the 20th Epistle of Morgagni de Sedibus et Causis Morborum, particularly the 9th, 33d, 35th, 39th, 41st, 43d, 47th, 49th, and 62d sections of it, and some parts of his 21st Epistle, he will find, that the symptoms regarded as peculiar to pleurisy have frequently attended the parenchymatous inflammation of the lungs; he will find that the acute pain supposed to characterize the inflammation of the pleura, has often been present when it appeared on dissection that there had been no inflammation of any part of this membrane.

When we inspect the bodies of those who died of inflammation of the lungs. (says Schroeder*) they alone are sometimes inflamed, although all the symptoms of pleurisy had been well marked. Petrus Servius opened three hundred people, at Rome, who died with the symptoms of pleurisy, in all of them the lungs were greatly inflamed, the pleura little or not at all. Tissot met with similar cases, and Diemerbroeck says, that in two or three cases in which there had been no acute pain, and where consequently, according to the common opinion, the parenchyma of the lungs alone should have been affected, the pleura equally partook of the disease. Even Burserius observes, that dissections are not wanting to prove that inflammation of the pleura has been present without any pain at all. Sydenham seems to go so far as to believe the parenchyma of the lungs to be very frequently the seat of pleurisy. And Juncker observes, in his *Conspectus Pathologiæ*, that pleurisy often passes into peripneumony, by which we may understand, that the parenchyma was found inflamed where the symptoms had been those of pleurisy; for such is the prejudice in favour of this division of pneumonia, than when it was found that the appearances on dissection were not as were expected, it was supposed that the one

* Opusc. Med.

form of the complaint had passed into the other ; an opinion, however improbable, which seems to have been sanctioned even by Haller. Yet we find some of the oldest writers expressing their doubts of the inferences drawn from the symptoms of pneumonia, respecting the precise seat of the inflammation. Hippocrates speaks of pleurisy and peripneumony as affections much akin, if he does not go farther ; and Galen observes, that the pain in peripneumony is sometimes acute. I need hardly add that the conclusion from all these observations, and many more might be added from authors of equal authority, is, that we cannot, from any of the symptoms of pneumonia, positively determine whether the seat of the inflammation is in the parenchyma of the lungs or the pleura.

The remaining question is, whether the foregoing division of pneumonia assists us in the treatment of the complaint. When we come to consider the practice in pneumonia, this question will be readily answered. We shall find that whether the symptoms be those of peripneumony or pleurisy, the mode of treatment is the same ; nor does the prognosis vary, the symptoms characterizing these varieties not being those from which it is collected. Of what use then is the division in question ? Are we not warranted to adopt the sentiments of those who have wholly rejected it ?

It is proper to observe here, that there are two other complaints, which have been termed peripneumony and pleurisy, frequently confounded with pneumonia, which differ essentially from it as well as from each other, both in their symptoms and their modes of treatment, namely, the bastard pleurisy, and the peripneumonia notha ; on the former of these I shall presently have occasion to make some observations ; the latter must be considered more at length.

We shall find similar reasons for rejecting the other varieties of pneumonia. An inflammation of the diaphragm and that part of the pleura which lines it has been termed paraphrenitis, and is said to be attended with symptoms which distinguish it from inflammation of other parts of the thoracic viscera. " Paraphrenitis," says Huxham, " is attended with a very acute fever and " a violent pain extending from the lower ribs to the lowest vertebrae of the back, a short convulsive singultuous kind of breathing, a vast anxiety and uneasiness, dry cough, hiccup, and " delirium ; an excessive pain is particularly felt on every inspiration, which darts itself from the pit of the stomach to the " very loins, and the hypochondrium of the side affected is " drawn inwards and upwards under the ribs, while the abdomen " is scarce perceptibly moved in respiration, but remains fixed " and convulsed as it were by the violence of the pain in attempting an inspiration."

Huxham, however, overlooks the symptom which has been most celebrated as a diagnostic of paraphrenitis, a convulsive laughing, the risus sardonicus, as it is called from the name of an herb which was supposed to possess the power of exciting it.

But although delirium, the risus sardonicus, and others of the foregoing symptoms, have been observed where dissection discovered the diaphragm and its membrane to be the seat of the inflammation, it has more frequently happened that traces of inflammation have been found in them where it had not been indicated by these symptoms. Cleghorn confesses that, in a case which he had mistaken for common pleurisy, he found on dissection traces of inflammation neither in the lungs nor pleura, but in the diaphragm. Morgagni relates two cases in which the diaphragm was wounded without producing the risus sardonicus. This symptom has often been observed in intermitting fever and the common typhus without inflammation of the diaphragm. Strack mentions many cases of the latter; and Quarin gives one in which venesection was performed on the supposition of the diaphragm being inflamed, and proved fatal.

The symptoms which are said to characterize an inflammation of the mediastinum are, the pain being acute and felt under the sternum or between the shoulders, and shooting through the thorax from the one place to the other, accompanied with a cough which produces but a small and difficult expectoration. When the pericardium is inflamed, the pain, it is said, is deep seated, the oppression and anxiety are excessive, attended with palpitation of the heart and a constant inclination to cough. The same may be said of these cases as of the paraphrenitis; there is no doubt of dissections having shown traces of inflammation in the mediastinum and pericardium where the foregoing symptoms had been present, but there is as little doubt of these symptoms having been present when no traces of inflammation could be found in either, and of traces of inflammation having been found in both where none of these symptoms had appeared. "*Certe novimus pericardium sæpe inflammatum fuisse, sine ali-*" "*is præter peripneumonix signis.*"*

One would, a priori, be led to believe that the symptoms accompanying an inflammation of the heart must differ essentially from those attending inflammation of any other of the thoracic viscera. This however is far from being the case. Dr. Cullen, indeed, in his system of nosology, makes carditis a distinct genus from pneumonia, but observes, at the same time in a note, that he agrees with Vogelius in believing that the symptoms of carditis are almost the same with those of peripneumony, but in general more severe. Linnæus, he observes, must also have been

* Cullenis Synopsis Nosol. Method.

of the same opinion, since neither carditis nor pericarditis are arranged as distinct complaints in his system of nosology.

Dr. Cullen defines carditis, a fever with a pain in the region of the heart, anxiety, dyspnœa, cough, an irregular pulse, palpitation, and syncope. From this definition would the following case from Wendt be regarded as one of carditis. A man of thirty-six years of age, he observes, complained of a pain in the left side with a violent and painful cough, and was obliged on account of the dyspnœa to remain in the erect posture; the cough was moist and much yellow matter was expectorated without relieving the symptoms. Guided by the foregoing definition, should we assert that in the foregoing case the heart was inflamed. On dissection it was found that both the heart and pericardium were inflamed, and pus was found among the muscular fibres of the former. Many similar cases might be adduced to shew the insufficiency of any diagnostic symptoms of carditis. If an irregular pulse attends the symptoms of pneumonia, and actual syncope occurs, it is more than probable that the heart is inflamed, but these symptoms are far from being constant attendants on carditis, and the former very frequently attends other cases of pneumonia.

There is still another affection which the reader will find regarded by writers as distinct from other forms of pneumonia. It appeared unnecessary to speak of it at length, as there is hardly a shadow of reason for regarding it as a distinct disease. I allude to the affection termed by authors the *pleuritis vera*, by which is understood an inflammation of the *pleura costalis*, which does not spread to the *pleura* of the lungs or any other neighbouring part. That such a case has existed is certain, but dissection is the only means by which its presence can be ascertained.

I have not mentioned the erysipelas of the lungs as a division of pneumonia. This term is now little used, and seems never to have had distinct ideas annexed to it. In different authors the reader will find different accounts of what is meant by it; and as for rheumatism of the lungs, a term used by some writers, it is employed very inaccurately to express some one or other of the foregoing affections.

Such are the symptoms of pneumonia, and the facts which have induced many of the best writers to regard as one complaint the inflammation of all the thoracic viscera.

Pneumonia is either simple and idiopathic, idiopathic and complicated with other diseases, or symptomatic. Pneumonia complicated with typhus is termed *peripneumonia putrida*, or *maligna*; with synocha, the *peripneumonia ardens*, or *synochus pleu-*

riticus. Pneumonia complicated with catarrh is called by authors the pleuritis catarrhalis or lymphatica.*

It will be necessary to consider some of the symptomatic pneumoniæ at greater length, otherwise the symptoms of the idiopathic and symptomatic may be confounded, and thus much confusion introduced into the treatment as well as the history of the disease. The reader will find many different species of symptomatic pneumonia mentioned in the 102d, 105th, and 106th pages of Dr. Cullen's Nosology, and many more in Burserius's Institut. Med. Pract. But those which chiefly demand attention are the pleuritis or pleurodyne verminosa, or stomachalis, as Bianchus calls it, and the pleuritis biliosa, which Dr. Cullen seems to have overlooked. It will also be necessary to make a few remarks on bastard pleurisy; and I shall make such observations on the treatment of these forms of the complaint as shall prevent the necessity of again making mention of them, which will occasion no embarrassment to the reader if he is acquainted with what has been said of the treatment of the phlegmasiæ in general.

Any thing which greatly deranges the stomach and intestines, often occasions a pain in some part of the side, accompanied with more or less dyspnœa; and careless observers may mistake such cases for cases of pneumonia. On examining the pulse, however, the difference is very apparent. In the former the pulse is natural or nearly so; besides, in these cases there is not necessarily any cough.

But it appears from many observations that a certain degree of irritation of the stomach and bowels is capable of producing true pneumonia. How, for example, shall we otherwise account for the frequent combination of this complaint and worms in the intestines?

In the 43d, 44th, and 45th sections of Morgagni's 21st Epistle, the reader will find the pleuritis verminosa treated of at some length. He mentions one case, in which all the symptoms of pleurisy were well marked, terminated by a bloody vomiting which brought up a lumbricus. We might in this instance attribute the relief obtained rather to the loss of blood than the expulsion of the worm; but he refers to a paper of Pedratto on the pleuritis verminosa, where the relief obtained by the expulsion of worms from the stomach and intestines, particularly from the former, is proved beyond reply.

It appears from what is said in this paper, that all who vomited worms or passed them by stool recovered, while those who did not died. All the common modes of treatment in pneumonia fail-

* For other combinations of this kind see Dr. Cullen's Synop. Nos. Method.

ed, anthelmintics alone were successful. The cases related by Pedratto are the more remarkable, that they did not appear in solitary instances, but as an epidemic attacking the inhabitants of a whole town and neighbourhood.

While the expulsion of worms from the *primæ viæ* instantly relieves the symptoms, it is impossible for us to believe that there is any inflammation in the thoracic viscera. Fever frequently attends worms, and it does not seem difficult to explain how they may occasion pain in the side and dyspnœa. If it be asked, says De Haen,* in what manner worms occasion the symptoms of pleurisy without the actual presence of inflammation in any of the thoracic viscera, it is not difficult to answer the question. Some parts of the intestines, he observes, rise as high as the 9th, 8th, 7th and even the 6th rib. Now if lumbrici adhere to these parts, biting and tearing the intestine, must they not occasion a pain resembling that of pleurisy? Will not the wounded intestine be pained more acutely when it is pressed by the diaphragm in a full inspiration, and if the respiration be thus hurt can we suppose that there will not be some degree of cough? This explanation is very intelligible. There is one circumstance, however, overlooked by De Haen, which tends to involve the nature of the pleuritis verminosa in much obscurity. In those who die of this complaint the same traces of inflammation are found in the thoracic viscera as in those who die of other forms of pneumonia.

Pedratto found on examining the thorax of one of his patients the whole lungs swelled on the left side, which had been the seat of the pain; they were inflamed and of a dark colour, and in the interior part there was a collection of white ichorous matter. The pleura was every where inflamed, livid, and marked with red points. The intercostal muscles partook of the inflammation. Thus it appears that the false pleurisy, arising from the affection of the *primæ viæ*, for we have no reason to believe that there is any thoracic inflammation at the commencement of such cases, is in the progress of the disease changed into the true pleurisy, but why it is so it is impossible to say. Morgagni's explanation of this fact seems inadmissible.

If the presence of worms in the intestines is capable of exciting pneumonia, it is not surprising that they aggravate its symptoms, and therefore that all who labour under this disease die if the offending cause is not removed. The bilious pleurisy seems only to differ from the pleuritis verminosa in the difference of the irritating cause. The presence of bile in the intestines produces in this case nearly the same effects which the presence of worms does in the former. It has been observed, that the pains in the bilious pleurisy are wandering, the cough dry and troublesome,

* Method. Medendi.

with little and difficult expectoration, the pulse quick and frequent, the watching constant, the anxiety great. In this case, Burserius observes, blood-letting hurries on the fatal termination, which often happens on the fifth day when this remedy has been employed, but is generally delayed to the 7th, 9th, or 11th where it has been avoided. The less useful blood-letting is in pneumonia, Schroeder observes, the more reason there is to suspect an accumulation of bile in the stomach and intestines. The accounts which we have of the bilious pneumonia are less distinct than those of the pleuritis verminosa. This arises from complaints of different kinds having gone by the name of bilious pleurisy, for some authors have termed every case of pleurisy bilious in which the spitting was thin and yellow. The bilious pleurisy is best characterized by the various symptoms indicating the presence of bile in the primæ viæ; the patient having on former occasions been subject to bilious complaints, and the causes of such complaints having been applied, assist the diagnosis.

The chief symptoms denoting the presence of bile in the stomach and intestines are a sense of oppression, nausea, and a bitter taste in the mouth, with giddiness and pain in the head, and an unusual fetor of the fæces. These symptoms, Schroeder observes, sometimes do not appear till after one or two blood-lettings. In many cases of bilious pleurisy, he observes, blood-letting is inadmissible. Emetics and cooling cathartics must be had recourse to, and when they succeed in removing the cause of irritation from the primæ viæ, the pneumonia often ceases, and even nature, he adds, frequently relieves this disorder by spontaneous vomiting and purging. "In this month of February," it is observed in the 5th volume of the Edinburgh Medical Essays, where the reader will find a good account of this species of pneumonia, "a pleurisy which had something uncommon in it was very frequent in life, and at first proved fatal to many. It began with shivering, head-ache, trembling, and bilious vomiting, which after two days were succeeded by a pungent pain among the short ribs, difficult breathing, and a short cough. The thirst of the sick was moderate if they were not blooded, but when as much blood was taken as the degree of pain seemed to require, the thirst increased, as likewise the sickness of the stomach, till they fainted. The pulse quickly sunk on drawing blood, which was brownish, yellowish, or greenish, and hardly coagulated. The sick slept none through the whole course of the complaint, which continued for twenty-five or thirty-two days. When blood-letting was omitted or used very sparingly, and vomits were given early and afterwards repeated with refrigerants, laxatives, and expectorants, as far as the stomach would bear, the patient generally recovered. Very strong emetics did not answer."

The reader, however, will find some difference of opinion res-

pecting the employment of blood-letting in the bilious pleurisy. Bianchus, in his *Historia Hepatica*, regards it as pernicious only at the commencement. From what was said concerning the pleuritis verminosa, which is also applicable to the case before us, it is more than probable that the lungs in bilious pleurisy are not inflamed at an early period, which may account for blood-letting being less successful then than when the disease is farther advanced. It is asserted by Cleghorn, respecting a bilious pleurisy which came under his observation, that much blood-letting was necessary, and that, after trying many remedies, this, with proper means to clear the stomach and bowels, was found the only successful mode of treatment. The only way in which we can account for such opposite opinions is by supposing something different in the nature of the different epidemics. And, indeed, it must happen, that in different epidemics the tendency to inflammation of the lungs, from the season of the year, state of the weather, or some less evident cause, will be different; and the greater this tendency, it is evident the sooner will the inflammatory symptoms succeed the bilious, and the more early may blood-letting be employed with advantage. It has been observed, that the blood in the pleuritis biliosa does not shew the buffy coat, but it is more than probable that this observation does not apply universally.

It is remarkable that bilious pleurisies sometimes obey the tertian type.* When this happens we must suppose that no real inflammation exists. Capel justly observes, in his treatise "De *Pneumonia Typhode*," that pneumonia never assumes, as some have supposed, a regular intermitting form.

The foregoing observations point out in a striking manner the necessity of clearing the *primæ viæ* in all cases of pneumonia, whether symptomatic or not.

It is observed above, that we frequently meet with schirrus of the liver, pancreas, or spleen, in those who die of pneumonia, and more frequently, we have reason to believe, than can be ascribed to chance. May not schirrus of these parts, particularly that of the liver, by an irritation similar to that which produces the pleuritis verminosa and biliosa, sometimes excite pneumonia? In a large proportion of the dissections of those who died of pneumonia, given by Morgagni, the liver or spleen was found indurated or otherwise unhealthy, or some of the other abdominal viscera, particularly the pancreas or ovaria, were diseased.—Pneumonia is comparatively rare in young children. Dr. Beardsley, in the *Memoirs of the Newhaven Society*, however, mentions an instance of an infant dying of this complaint, in whom the liver was found to be schirrous. I have several times, indeed, seen pneumonia evidently induced by this affection of the liver, and in one of my patients who died of schirrous liver,

* Bianchus' *Historia Hepatica*.

the lungs throughout their whole extent adhered to the sides of the chest.

The other cases of symptomatic pneumonia require little or no comment. The pleuritis athritica I shall have occasion to mention when I come to speak of gout. The pleuritis morbillosa was noticed in the Chapter on Measles; there is nothing particular either in its symptoms or mode of treatment. The pleuritis hydrothoracica appears in general with little pain but much dyspnœa, and is best relieved by repeated blisters applied to the chest, and small doses of calomel. The pneumonia phthisica, that inflammation of the lungs which forms the first stage of phthisis, has, though with little propriety, been ranked among the symptomatic pneumonia. We shall soon have occasion to consider it at length.

The complaint which has been termed the bastard pleurisy, is nothing more than rheumatism, that is, an inflammatory affection of the intercostal muscles, producing an acute pain of the side, increased on inspiration. It is attended in general with little or no fever and scarcely with any cough. An inflammation of the intercostal muscles often spreads, as I have myself repeatedly seen to the pleura and lungs, producing a true pleurisy. Thus we find a case related by Huxham, in which some of the muscles of the thorax were wounded, from which, the inflammation spreading to the viscera, the patient soon laboured under all the symptoms of pneumonia.

But whether bastard pleurisy be the sole disease, or combined with pneumonia, its presence may always be detected by the increase of pain which takes place on the exertion of the inflamed muscles. Besides, where it is present to a considerable degree, the patient generally complains of soreness on the seat of the pain being pressed. The bastard pleurisy generally yields to local means, or these combined with the internal use of the guaiacum, or the means which promote a free flow of sweat. In short it is to be treated as a case of chronic rheumatism.

There is still another variety of pneumonia which demands attention. It has been termed the putrid pneumonia. Comparatively few authors have treated of this form of the complaint; in the accounts which we have of it there are many observations which cannot be reconciled, and the subject, upon the whole, is involved in some confusion. The following, as far as I can judge, is a general abstract of what has been ascertained respecting this complaint.

The pneumonia putrida is of two kinds, idiopathic and symptomatic. The latter is that which is most generally known; it consists merely in pneumonia supervening on the typhus gravior. This is the only putrid pneumonia acknowledged by Dr. Cullen. But it seems ascertained by the observations of many writers

that there is an idiopathic putrid pneumonia, a primary inflammation of the lungs accompanied with strongly marked typhus. And this form of the disease has frequently appeared epidemic, while the more common form did not shew itself. The idiopathic putrid pneumonia, when exquisitely formed, appears with nearly the same symptoms as the symptomatic, only the inflammation is present from the commencement.

It has been observed to attack chiefly those of debilitated habits, frequently such as labour under chronic diseases of debility, the scurvy for example. Very young and very old people and females, Cappel observes, are most subject to it. He also thinks, that the presence of tubercles and an ill-formed thorax dispose to this form of the disease.

The occasional causes of the putrid pneumonia are nearly the same with those of the phlegmasiæ in general. Among its causes Cappel enumerates impurities of the primæ viæ, and observes, that the common pneumonia may be changed into the putrid by heating or very debilitating medicines.

The usual treatment of pneumonia is inadmissible in this form of it. All who were bled, Tissot observes, died. The general plan of treatment seems to be a combination of that of typhus with the local treatment of pneumonia and proper measures for clearing the primæ viæ. The employment of all these means, however, requires much attention.

When the tendency to gangrene and hemorrhagies is great, blisters are improper, both on account of the evacuation which they occasion, and because they sometimes give rise to gangrenous sores. On these accounts Cappel advises the blisters to be removed as soon as the skin is inflamed. Local blood-letting he thinks injurious; others are of a different opinion, and it is only, perhaps, where the debility is very great that this remedy is to be dreaded. But there are instances of bleeding from scarification of the side in this complaint becoming so obstinate and profuse as to baffle every attempt to stop it till the patient expired. Dry cupping, where the debility is very great, is used with more safety, and often brings relief. Cappel recommends fomentations, cataplasm, volatile liniments, and warmth applied in every other way. He also particularly recommends watry vapours drawn in with the breath.

With respect to medicines acting generally, there is none of equal efficacy with the bark and wine; the former is particularly recommended by Quarin and others. The expectoration is often increased, says Quarin, and the patient as it were snatched from death by the bark, especially if the fever, as sometimes happens, shews a tendency to remit. The bark, however, does harm if given incautiously. If the inflammatory symptoms run high, Cappel justly observes, the bark is hurtful. Wine is of

more general use. There is no case of putrid pneumonia where it may not be employed with advantage. The quantity must be proportioned to the degree of debility. I have given port wine to the amount of a bottle in the day in symptomatic putrid pneumonia with the best effects. The other remedies acting on the system in general are less to be depended on. The ammonia acetata has been regarded as useful when the skin is very dry. Antimonials given cautiously are of service when the expectoration is difficult. The seneka is not to be depended on. Cappel recommends camphire given in small and repeated doses, but relies more on musk, which he gave in very large quantity where other means had failed. Mercury he thinks useful if given so as to prevent its occasioning much evacuation. Opium has been much recommended for allaying pain, procuring sleep, easing the cough, and stopping diarrhœa. The observations made on the diet in typhus are applicable here. It is, however, of still more consequence to guard against every thing that deranges the primæ viæ. It has just been observed that the presence of noxious matter in these passages often has much share in producing the putrid pneumonia; this is particularly the case when it appears as a symptomatic affection in typhus. Whether symptomatic or idiopathic, it is often accompanied with the symptoms peculiar to bilious pneumonia. In the putrid pneumonia therefore clearing the alimentary canal forms an essential part of the treatment. The operation of cathartics, however, is too debilitating, and it seems very generally admitted, both on this account and because the chief cause of irritation seems to be in most instances lodged in the stomach, that emetics are the best means of removing it. It appears from the observations of some, says Quarin, that the life of the patient has been saved by the operation of an emetic. Emetics, says Cappel, are useful if the stomach be oppressed and in other cases at the commencement, especially if the disease arise from contagion. They are also useful when the matter to be expectorated is copious and viscid, but we must be cautious, he adds, that we do not occasion purging instead of vomiting, which often proves fatal. Schroeder also remarks, that if the emetic in putrid pneumonia occasions purging instead of vomiting, the complaint almost always proves fatal. On this account, Cappel recommends ipecacuanha in preference to other emetics, as large doses of it may be given with safety. Other writers make similar observations. When we have succeeded in removing the symptoms of putrid pneumonia, it is necessary to have recourse to bitters and aromatics, and, if it can be given without tending to renew the inflammation, to the bark, in order to strengthen the stomach and system in general, which is the best means to prevent a relapse.*

* For an account of the putrid pneumonia the reader may consult Camerarius de Pleuritide Maligna, in the 2d vol. of Haller's Disput. ad Morb. Hist. et Curat. Pertinent. De Preval, on vomiting in Putrid Pneumonia, in the same volume. Quarin de Febribus, Huxham's Tréa-

SECT. IV.

Of the Causes of Pneumonia.

THOSE who are strong, vigorous, and full of blood, use much exercise, and readily digest their food. are most subject to pneumonia, especially such of this description who are subject to coughs. The least subject to this complaint are those of a relaxed and weakly habit, bad digestion, and an indolent disposition. It has been an observation from the infancy of medicine, that those who complain of acidity of the stomach are not subject to pleurisy. It is true, indeed, that the latter are particularly subject to pains which resemble pleuritic pains, and may deceive the inexperienced; these pains, however, never affect the pulse, and generally disappear on the expulsion of wind from the stomach.

Middle life or rather later, Dr. Cullen says, between 45 and 60, is the period most subject to inflammation of the thoracic viscera. Cases of pneumonia are comparatively rare under puberty, and they are not frequent in the aged. Old people, we shall find, are more subject to the peripneumonia notha than to the true pneumonia.

Winter and spring, especially the latter, are the seasons at which pneumonia most frequently appears. It is generally the more frequent, the colder, the moister, and more changeable the weather is. Huxham says he has seen the same epidemic in low warm situations near the sea prove only a catarrhal fever, in more exposed cold situations a true pneumonia. In the observations of the army physicians, however, we find pneumonia proceeding from extremes of weather, whether warm or cold. Dr. Donald Monro observes, that the soldiers were attacked with pleurisies at all seasons of the year when they were exposed to the intemperance of the air, whether it was very cold, very warm, very dry, or very moist. Sir John Pringle makes similar observations.

That mode of life which has been mentioned as predisposing to inflammatory complaints in general is most favourable to pneumonia, the use of a large proportion of animal food, especially if high seasoned, and the indulgence in the free use of fermented liquors. The same may be said of every thing which occasions habitual fullness. Repelled eruptions, suppressed excretions, even drying up an issue or the healing of an old sore, predispose to this complaint.

Of the exciting causes of pneumonia the sudden or partial ap-
tise on Peripneumony, Schroeder's Treatise, De Pleuritidum Partitione, in his Opusc. Med. and a Treatise, De Pneumonia Typhode, by Ludov. Christoph. Guil. Cappel.

plication of cold is the chief. A cold air rushing through narrow chinks upon the naked body, says Boerhaave, which has been heated by exercise or fire, taking suddenly large draughts of cold water under the same circumstances, or exposure to a very cold north wind, often excite pneumonia. Any of the predisposing causes applied suddenly and to a great degree may excite the disease. Such are the causes which pneumonia has in common with the other phlegmasiæ.

Those which are peculiar to it act immediately on the lungs ; violent exercise, forcing the blood too rapidly through the lungs, violent coughing, receiving acrid vapours with the breath, other complaints of the thoracic viscera, asthma, hydrothorax, callosity of the pleura, or similar affections pressing on the lungs.

Adhesions of the pleura are generally ranked among the causes of pneumonia. It is only, however, when very extensive that they are apt to excite this disease.

There are few of the phlegmasiæ so easily renewed in those who have formerly laboured under them as pneumonia. Hoffman says he has seen the same person attacked with pneumonia four or five times within a twelvemonth.

Pneumonia is frequently epidemic, but never it is observed by Morgagni and others who have been most conversant with this complaint, contagious, as some have supposed. This observation, however, only applies to the common form of the disease ; it seems very generally believed that the putrid pneumonia is contagious. Some diseases of the abdominal viscera are to be ranked among the causes of pneumonia ; this subject has already been treated of at sufficient length.

SECT. V.

Of the Treatment of Pneumonia.

THE treatment of pneumonia, like that of the other phlegmasiæ, may be divided into general and local. The most vigorous general means are necessary in all cases of pneumonia. As they form the most important part of the treatment, and that which is first recommended, it will be proper to consider them before the local remedies.

The mode of treatment in pneumonia differs but little from that of the phlegmasiæ which have been considered. The chief difference arises from the nature and importance of the organ affected. The first remedy employed is general blood-letting, which, if the symptoms are urgent, should be pushed far enough either to relieve them while the blood flows or occasion a tenden-

cy to syncope. It has been observed, that those who are subject to syncope on the loss of blood, bear the second or third blood-letting better than the first, which is an additional argument for not pushing the blood-letting till syncope supervenes, at one time recommended in this complaint, but now justly regarded as a very precarious practice.

It is supposed by many, that bleeding from the arm on the side affected in pleurisy is more effectual than from the arm of the other side. Dr. Cullen does not seem to think this opinion groundless. It may be safely asserted, however, that blood-letting from the side affected is not of such importance as to induce us to recommend it where it is more convenient to let blood from the other side.

Our view in letting blood from the arm is to diminish the vis a tergo, and this is done equally well from whatever vein the blood is taken, provided it is of the same capacity and equally near the heart : and as to the effects of local blood-letting, which I have already had occasion to consider at sufficient length, they are procured with most certainty in this complaint by bleeding from the chest.

Werlhoff has even gone so far as to assert, that in one instance he had seen the blood drawn from the side not affected natural, while at the same time blood drawn from the side affected shewed the buffy coat. Other physicians, however, have maintained, that the side not affected is that from which blood should be taken in pneumonia. The reader will find an account of the disputes on this subject in Van Swieten's Commentary on Boerhaave's 890th Aphorism. In many places they were conducted with great acrimony, and in Portugal an edict was issued by Government prohibiting any physician from letting blood in pleurisy from the side affected.

It was a custom among some of the old practitioners to open the arteries of the hand in pneumonia, and that which lies between the thumb and forefinger was generally chosen. Dr. Friend observes, in his History of Medicine, from the days of Galen to the beginning of the sixteenth century, that that physician was the first who recommended this mode of blood-letting in the complaint before us. Gesnerus, in his Epistle to Cratto, and some other writers, have maintained, that there is no part of the arm from which it is proper to let blood, and that the patient can only be saved by drawing it from the foot. On such observations any comment is unnecessary. When the jugular vein can be readily struck it is probably of advantage to take the blood from a vein which pours its contents into the thorax. Boerhaave considers it of so much consequence that the blood should be drawn off as suddenly as possible in this complaint, that he not only advises it to be taken from a large orifice, but that the patient should endeavour to quicken its flow by breathing

quickly and coughing. In practising this it is evident that some caution is requisite.

There are few cases of pneumonia which yield to the first blood-letting. For even where it gives most relief the symptoms generally soon return, and demand a repetition of the same remedy.

If it be found, says Boerhaave, on repeating the blood-letting that the buffy coat has disappeared, we are warranted to dissuade from the further use of the lancet. And the reader will find this observation made by many others. But Dr. M'Bride has justly observed, that the inference drawn from the disappearance of the buffy coat is only true when the symptoms at the same time abate, for there are many inflammations where the buffy coat is never seen. "Some practical physicians," says Dr. Millar, "have directed blood to be taken till the sily crust which generally covers its surface disappears. But this rule is extremely equivocal; in some the blood puts on this appearance at the beginning, in others not till towards the decline of the disease, and sometimes no such crust is observed through the whole course of it. The only certain indication therefore arises from the mitigation or violence of the symptoms."

Yet the appearance of the blood which has been drawn is not to be wholly overlooked, for the buffy coat becoming less thick is generally a sign of the disease becoming milder, and it often happens that there is no more occasion to draw blood after it disappears.

Triller and some other respectable writers have advised, in repeating the blood-letting in this complaint to take the blood from different parts of the body. The arm of the side affected he recommends as the best place for the first blood-letting, for the second he considers the foot of the same side the proper place, and for the third the other foot. Little need be said of this conceit; the reasons which determine our choice of the vein in the first blood-letting are of equal force in repeating the remedy.

It has been said, that blood-letting in pneumonia is improper after the fourth day. The truth of this observation is now called in question, and it is very generally admitted that although it is most effectual when had recourse to within the first three or four days; it must be employed if the symptoms of pneumonic inflammation are well marked and the strength of the patient sufficient to bear it any period of the disease. In cases where the symptoms have occasionally remitted I have known blood-letting in the second or third week attended with the best effects; if the disease has run its course without any evident remission, blood-letting is seldom proper at so late a period.

What chiefly demands attention in the repetition of blood-let-

ting in pneumonia, is not to employ it after the tendency to sup-
puration has supervened, which is known by the symptoms above
pointed out.

The reader will find stated by many writers, the quantity of
blood which must upon the whole be lost in the cure of pleuri-
sy. In adults, says Sydenham, pleurisy is seldom cured with
the loss of less than forty ounces of blood. It is evident, howev-
er, that no general rule of this kind can be laid down. The rep-
etition of the blood-letting, as well as the quantity to be drawn at
each blood-letting, must be determined by the state of the symp-
toms and the strength of the patient.

The reader will find it a favourite opinion with the majority of
writers, that as soon as spontaneous evacuations which may
prove critical take place, all artificial evacuations should be dis-
continued, as tending, it is said, to disturb the salutary efforts of
nature.*

When a spontaneous evacuation relieves the symptoms there
is no occasion for blood-letting, and it is proper at all times as
much as possible to save the patient's strength; but when any
such evacuations occur without bringing relief, or when they do
to a certain degree bring relief, but the symptoms are still such as
threaten danger, their presence must not deter us from the em-
ployment of blood-letting, nor does blood-letting cautiously em-
ployed tend to interrupt a free expectoration or other salutary
discharge, but frequently promotes it.

Although at all periods of the disease, when the symptoms run
high, blood-letting is a remedy on which we chiefly depend,
there can be no doubt that by many it has been carried too far.
There is no complaint in which an unguarded use of the lancet is
not dangerous. If too much blood is taken away in pleurisy, says
Hoffman, the expectoration will be impeded, the obstruction con-
firmed, and sphacelus will be apt to ensue.

It has been observed above, that when the disease has been
tedious and the strength much reduced, the matter poured into
the bronchiæ stagnates there, the patient being unable to free his
lungs from the load till it accumulates in such quantity as to occa-
sion suffocation. The same debility, with its consequences, are
to be dreaded from the unguarded use of the lancet. But al-
though the debility induced by blood-letting produces neither suf-
focation nor gangrene, yet it often proves the cause of death by
giving rise to other complaints. Where blood-letting has been
much employed, pneumonia is frequently followed by hydrotho-
rax or asthma.

* See the 889th Aphorism of Boerhaave, Dr. Millar's Account of the
Diseases of Great Britain, and other works on this disease.

When a tendency to hemorrhagy appears in pneumonia, it is by many judged better to promote the hemorrhagy than to draw blood from any other part. If epistaxis, bleeding from the nose, occurs, we are advised to foment and irritate the nares. When hemorrhoids supervene, if the flow of blood is not sufficient to relieve the symptoms, it has been the practice to increase it by fomenting the parts in its neighbourhood and applying leeches. If, however, the hemorrhagy thus increased does not soon relieve the symptoms, we must have recourse to blood-letting in the usual way.

Some difference of opinion has arisen concerning the employment of cathartics in pneumonia; some use them for the purpose of increasing the effects of blood-letting. There is the same objection, however, to this practice in pneumonia as in other cases which have been considered, with this in addition, that a spontaneous diarrhœa, especially at the commencement of the complaint, is generally hurtful. It is true, indeed, that in the case of spontaneous diarrhœa, the injury may proceed rather from the irritating matter which occasions it, than from the diarrhœa itself. Experience, however, seems not to warrant the frequent employment of cathartics in this complaint, except for the purpose of freeing the primæ viæ of any irritating matter which may oppress them. In this, as in other cases of phlegmasiæ, calomel is the best cathartic. Where there are no symptoms of disordered bowels, small doses of calomel, by their anti-inflammatory tendency, are still useful; but it is better to procure the regular expulsion of the fæces by clysters, than risk much catharsis.

The impropriety of emetics in all cases which are not immediately connected with the state of the stomach is so apparent, that they are reprobated by almost every writer on the subject.

But neither the fear of exciting vomiting, nor occasioning catharsis, should prevent the guarded use of nauseating doses when the inflammatory symptoms are considerable. These, Dr. Cullen justly observes, particularly the antimonials, are the best means of promoting expectoration; and they have the additional advantage of relaxing the skin, which is of so much consequence in pneumonia.

The advantage derived from spontaneous sweating in this complaint has induced many to recommend more powerful sudorifics, but these have not answered the expectations formed of them. I have already had occasion to observe, that the effects of spontaneous sweating are seldom obtained by that which is procured by art; when, however, such a flow of sweat does supervene as relieves the symptoms, it is proper to encourage it by dilution and gentle diaphoretics.

It sometimes happens that even spontaneous sweating, particularly if it be partial and clammy, serves no other purpose but

that of reducing the strength. Such sweating must always, though with caution, be checked, which may generally be done by diminishing the allowance of fluid and removing part of the bed clothes.

It appears from what was said of the symptoms of pneumonia, that there is no evacuation so salutary in this complaint as a free and copious expectoration. On this account the various medicines termed expectorants are very generally employed in pneumonia. Few of them, however, are well adapted to this complaint. The various gums and even squills, by the irritation they occasion, frequently increase the febrile symptoms, and thus even render the cough tighter. From the relief obtained from these medicines in asthmatic cases, and from such cases being often confounded by practitioners with pneumonia, it seems to arise that they are very generally recommended in the latter complaint; for, as far as I can observe, they do no good in pneumonia, and often much harm by increasing the fever and the sense of tightness in the chest.

The ammonia is sometimes serviceable in promoting expectoration towards the decline of the disease. But if we except nauseating doses of emetics, we shall find no expectorants so useful in pneumonia as mucilaginous mixtures, anodynes, and watery vapour received into the lungs. It was once a prevalent opinion, that the advantage derived from mucilaginous medicines arose from their being received into the mass of blood and carried to the lungs, where it was supposed they rendered the matter about to be expectorated of a proper consistence. This supposition led to forcing the patient to take large quantities of them, which, by oppressing the stomach, often did more harm than good.

It is now pretty generally admitted, that the chief effect of these medicines is that of besmearing the fauces, and allaying the irritation, which keeps up a constant cough, and thus prevents the matter poured into the lungs from remaining there till it has acquired a due consistence,* without which it cannot be freely expectorated. To answer this purpose they should be given in small and frequently repeated doses. They seem also to be of some service in lining the stomach and bowels, and thus preventing any irritation from their contents. As might be expected from this view of the manner in which these medicines act, they are found most serviceable when the expectoration is thin and watery. In such cases opiates are the most powerful expectorants when they can be given without increasing the inflammatory symptoms; their operation is similar to that of the foregoing medicines, they allay the irritation which keeps up the

* It is a law of the animal œconomy, that while secreted fluids remain in any of the cavities, the absorbents are constantly employed in taking up the thinner parts.

cough, and prevents the matter acquiring a due consistence, but by lessening the sensibility, their effects are much more certain.

There is some difference of opinion respecting the employment of opiates in pneumonia, whether for the purpose just mentioned, or that of allaying pain. It would appear from the observations of foreign writers, that on the Continent they are very frequently employed with the latter intention. In young people, says Hoffman, small doses of opium combined with nitre and diaphoretics may be employed for the purpose of allaying pain, but in advanced life, where the juices are thick, they render the expectoration more difficult.

The practitioners of this country almost wholly confine the use of opium in pneumonia to its latter stages. When the difficulty of breathing is abated, the cough remaining, with more or less pain and watchfulness, opiates are employed with safety and great advantage.

Watery vapours are chiefly useful when the matter to be expectorated is viscid and tenacious. Some recommend impregnating these vapours with a variety of articles, onions, which are among the best, a variety of herbs, honey, &c. Vinegar has been particularly recommended. Dr. M'Bride advises a large sponge dipped in vinegar to be applied to the mouth and nostrils.

It is needless here to repeat what has been said of the use of saline medicines, particularly the saline draughts and nitre, which are useful in all cases attended with synocha.

All agree respecting the best regimen in pneumonia; it should be strictly anti-inflammatory. All kinds of animal food or heating fluids must be avoided, and the diet should consist of light vegetables with much dilution. The temperature of the patient's room should neither be so high as to increase the rapidity of the circulation, nor so low as to run the risk of increasing the inflammatory affection of the lungs, which a very cold air is found to do. A temperature of about 60° is the best, and it is of consequence that it should be kept as uniform as possible.

With regard to exercise, it is hardly necessary to observe that it should be avoided. Some, indeed, have advised the patient to be as much out of bed as he can easily bear. In this practice, however, there is much risk, and, except in the decline of the disease, no advantage whatever.

The reader will perceive that, if we except the means for allaying the cough, increasing the expectoration, and clearing the *primæ viæ*, there is but one view in the general means employed in pneumonia, namely, to diminish the *vis a tergo*. It appears from what has already been said, that certain medicines possess this power without occasioning any evacuation. There

is reason to believe that some of these will prove valuable medicines in visceral inflammation. The digitalis is the only one of this class which has obtained much attention, and, from the trials which have been made with it, it would appear that it is more likely to be of service in such cases than in the complaint in which it has for some time past been so frequently exhibited.

We have reason to believe, from observations related in the first chapter of this volume, that lessening the quantity of oxygen in the air which the patient breathes will be a means of relief in pneumonia.

We are now to take a view of the local remedies employed in this complaint; for I shall finish the consideration of the treatment in pneumonia while the inflammatory state continues, before I make any remarks on the means to be pursued when the unfavourable terminations of this complaint take place.

The most important of the local remedies employed in pneumonia are, local blood-letting and blisters. The former is the chief resource when the patient's strength is so far reduced that he can no longer bear general blood-letting, and it is chiefly under such circumstances that it has been employed. But it would appear, from the observations before made on the treatment of the phlegmasiæ, that the purposes served by general and local blood-letting are not exactly the same; that the one is better calculated to relieve the local congestion, the other to diminish the vis a tergo; from which it is evident, that wherever the symptoms run high there will be advantage from combining these modes of blood-letting.

Independently of other considerations, the strength will thus be saved, for it will always be found, that by combining local with general blood-letting, the extent to which it will be necessary to carry the latter will be much lessened.

With regard to the employment of blisters, some circumstances formerly insisted upon must be particularly attended to here. In all cases of phlegmasiæ, we have seen where the fever is considerable the use of blisters must be delayed till the symptoms are mitigated by proper evacuations, it being found that the early application of blisters in such cases tends to obviate the effects of these on which we chiefly rely. The period proper for the application of blisters in pneumonia must vary therefore according to the effects of the blood-letting. It is necessary that before their application the hardness of the pulse should be considerably lessened.

The blister should be pretty large and applied immediately over the seat of the pain. Some think considerable advantage is derived from permitting them to remain applied for several days. If the symptoms do not readily yield, it is proper to support the

discharge from the blistered part, or, what is better, to apply a succession of blisters. It is necessary to apply them to some part of the thorax, little or no advantage arising from them if applied to more distant parts.

Fomentation of the side affected in pneumonia is a very ancient practice, and was recommended by Hippocrates even before the employment of blood-letting. Fomentation of the pained side, indeed, probably from its simplicity, seems to have been the first remedy employed in pneumonia. At present, however, it is little relied on, the benefit resulting from its use seldom being found to compensate the trouble it occasions. It is still recommended, however by Hoffman, Burserius, and other foreign writers. In bastard pleurisy which is nothing more, we have seen, than an inflammatory affection of the intercostal muscles, the relief derived from fomentations is very considerable, and this has probably contributed to their being employed in pneumonia, many not distinguishing the two diseases with much accuracy.

As the pain in pneumonia is aggravated by the motion of the ribs, it is recommended by Boerhaave and others to wrap a roller round the thorax, by which, the motion of the ribs being prevented, considerable relief is obtained.

Such seems to be the treatment of pneumonia best warranted by experience. It is true, indeed, that other remedies have been celebrated in this complaint. These, however, have experienced the neglect they deserve, and the authority of Van Helmont will now go but a short way towards inducing us to trust the cure of this complaint to dried goat's blood; nor do many of the specifics which have been recommended since his time, appear less absurd.

A very few observations respecting the means to be employed when any of the unfavourable terminations of pneumonia have taken place, will be sufficient, for, in fact, very little can be done. If a patient recovers after an abscess is formed in any part of the lungs, he owes his safety more to the accidental seat and size of the abscess than to any remedy we possess.

If the abscess evidently points outwards it is proper to make an incision through the intercostal muscles, by which the patient has sometimes been saved. Dr. Donald Monro mentions instances in which this operation succeeded, and thinks it should more frequently be had recourse to. There is hardly any chance of recovery if the abscess is permitted to burst into the substance of the lungs; instant suffocation or hectic fever, with purulent expectoration, according as the abscess is large or small, being the consequence. In neither of which cases can medicine be of any avail; in the latter, indeed, a variety of means have been proposed, but in considering the phthisis pulmonalis we shall find

them all equally ineffectual. Nor can medicine do more where the abscess has burst into the cavity of the thorax forming the empyema ; in this case, indeed, it has been proposed, that the matter should be evacuated,* as in the case of abscess pointing externally. but here the operation promises but little, and I am not acquainted with any instance in which it has been successful.

It has sometimes happened, we have seen, that abscesses of the lungs will remain for a long time without impairing the health, and that the ulcers formed by small abscesses where the habit is favourable will heal spontaneously. In such cases medicine has nothing to do.

If an abscess in the lungs be generally hopeless, that of gangrene always is so.* It is probable, indeed, that although we had means capable of checking the gangrene, the hemorrhagy which constantly attends it in this organ would always be sufficient to prove fatal. Notwithstanding this case being so hopeless, plans of cure have been proposed. Boerhaave, in his 902d and 903d Aphorisms, lays down what appears to him the most probable means of relief. These, however, are evidently dictated by hypothesis, and their being generally abandoned is a sufficient proof of their inefficacy. Neither Boerhaave, nor his Commentator Van Swieten, indeed, give a single case in which they were put in practice. Can it be seriously imagined that the application of the actual cautery to the side can be of any avail when gangrene of the lungs has taken place ? And Van Swieten, in adducing the authority of Aretæus in favour of the practice, seems to have committed an error, for it does not appear that it was recommended by him as a means of checking the gangrene, but lessening the inflammation, with which view it might certainly be employed with advantage. "When in pneumonia," Dr. Millar observes, "gangrene has taken place little can be expected from medicine. If any thing can save the patient it is a liberal use of the Peruvian bark." The mention even of this powerful medicine might have been omitted where all seem equally useless.

It is observed above, that pneumonia has sometimes, though rarely, terminated in a callus or schirrus of the lungs. This termination is less unfavourable than the foregoing. It is, however, extremely obstinate, and generally continues to tease the patient for the remainder of life. Medicine seems to have little effect in resolving this induration ; a regular diet and exercise, however, if they do not remove, generally in some degree mitigate it.

When pneumonia terminates in hemorrhagy of the lungs, if there is time for the use of medicine, the mode of treatment is the same as in other cases of hæmoptysis.

* See Boerhaav. Aphor. Aph. 896.

It sometimes happens that pneumonia leaves the patient so much debilitated that he has not sufficient strength to cough up the phlegm which attends the resolution of the inflammation. When this is the case it now and then accumulates in such quantity as to occasion suffocation. Here we must have recourse to wine, and if there appears to be no tendency to a return of the inflammatory symptoms, to the Peruvian bark. It is particularly necessary for some time after pneumonia carefully to avoid its exciting causes.

CHAP. XI.

Of Peripneumonia Notha.

DR. CULLEN, in his System of Nosology, regards this complaint merely as a variety of pneumonia, and it cannot be doubted that it often is nothing more than inflammation of the lungs considerably modified by peculiarity of habit. Sometimes, however, it has much less of the appearance of pneumonia, and upon the whole differs from it so materially that notwithstanding what Dr. Cullen says of it in his System of Nosology, he found it necessary in his First Lines to treat of it separately from pneumonia. Although we admit, indeed, that the complaints are always of the same nature, their symptoms and mode of treatment are often so different, that it is necessary, in order to avoid confusion, to treat of them separately.

In laying before the reader the symptoms of peripneumonia notha, I shall in the first place give a view of the disease as it appears when it differs most from pneumonia, and afterwards point out in what manner it insensibly assumes more of the appearance of this complaint, till at length it is difficult to say by which name it should be called.

SECT. I.

Of the Symptoms of Peripneumonia Notha.

THE peripneumonia notha often makes its attack with symptoms so similar to those of a common catarrh, that it is hardly to be distinguished from it. In other cases it comes on with languor, restlessness, some degree of cold, shivering, or chills alternating with fits of heat, without being accompanied with catarrhal symptoms.

As the disease advances, which is generally without much fever, the patient complains of dyspnœa, much anxiety, and a sense of oppression and tightness about the precordia. A cough

generally comes on at an early period, attended with an expectoration of a white viscid frothy matter, which is rarely tinged with blood.

The cough often becomes extremely violent, attended by a head-ach, which in many cases is almost intolerable, giving a sensation, to use Sydenham's expression, as if the head were torn in pieces. This symptom is peculiarly characteristic of the disease.

Vomiting is frequent at an early period, especially when the cough is very violent, by which it is often excited. The matter thrown up by vomiting, as in simple fever, generally consists of a viscid insipid mucus.

But the cough is now and then wholly absent in peripneumonia notha. In this circumstance, and the occasional violence of the cough as well as in the head-ach and vomiting, this complaint differs essentially from the true pneumonia. It chiefly differs from it, however, in the febrile symptoms, which in the well formed peripneumonia notha are generally mild and often entirely wanting, the pulse at no period of the complaint being more frequent than natural, except when hurried by the cough, the tongue remaining moist, and the functions in general seeming but little deranged. The urine, however, is generally high coloured and turbid, and even where the febrile symptoms are most moderate the blood frequently shews the buffy coat.

The functions of the mind are in general but little disturbed. There is often, however, a considerable degree of vertigo, accompanied with much flushing of the face, and not uncommonly a degree of drowsiness which approaches to coma. The pain in the thorax is often absent, or so trifling that the patient never complains of it; he sometimes describes it as an obscure dull pain which is rather troublesome than severe.

There are few complaints in which the prognosis is more difficult than in peripneumonia notha, for when there is little appearance of danger a violent exacerbation often suddenly takes place and terminates the patient's life.* And this even happens at the very time when a considerable abatement of the symptoms has afforded hopes of recovery.

In most cases, however, death is for some time preceded by an alarming train of symptoms. A degree of coma supervenes, the face becomes hippocratic, the nails livid, and the voice hoarse, the patient complaining of great anxiety and a sense of oppression; the limbs at length become cold and the vital powers gradually sink.

* See the observations of Boerhaave, Cullen, and Lieutaud, and the 11th and other sections of the 21st Epistle of Morgagni de Causis et Sedibus Morborum.

When the peripneumonia notha terminates favourably, it is still more generally attended, than the true pneumonia, by a copious and free expectoration ; and if there be any thing which affords a just prognosis in this complaint, it is the state of this symptom. The greater the debility, the more oppressed the lungs, and the less free and copious the expectoration, the worse is the prognosis.

On reviewing the foregoing account of the peripneumonia notha, the reader will readily perceive how easily this complaint may assume the form of the true pneumonia. If a cough attend the peripneumonia notha, which is neither violent nor attended with vomiting, if the pain be more considerable than it usually is in this complaint, and the febrile symptoms run higher, it is not possible for us to distinguish the case from true pneumonia, or rather it must be regarded as such, and on dissection it will be found that the lungs are actually inflamed. Dissection, indeed, has often detected inflammation of the lungs when the symptoms were those of well formed peripneumonia notha, as appears from the dissections of Morgagni and others. In many cases, however, no traces of inflammation can be found, and the peripneumonia notha seems almost as much allied to catarrh as to pneumonia, and runs into it by degrees equally imperceptible. The ancients, indeed, seem to have confounded it with catarrh.*

SECT. II.

Of the Causes of Peripneumonia Notha.

THIS is one of the diseases which has been accurately described only in later times. "A disease under this name," Dr. Cullen observes, "is mentioned in some medical writings of the sixteenth century, but it is very doubtful if the name was then applied to the same disease to which we now apply it. It appears to me, that unless some of the cases described under the title of catarrhus suffocativus be supposed to be of the kind I am now to treat of, there was no description of this disease given before that by Sydenham, under the title I have employed here."

In the following paragraphs he observes, that, after Sydenham, Boerhaave is the first author who in a system noticed peripneumonia notha as a distinct disease, and that, notwithstanding the remarks of Lieutaud, who with confidence affirms that the diseases described by Sydenham and Boerhaave under the title of peripneumonia notha are different, he is of opinion, that not only the disease described by Sydenham and that described by Boerhaave are the same, but that that described by Lieutaud himself

* Eller de Cog. et Cur. Morb.

is not essentially different from them. And nobody, I think, who compares the accounts of this disease given by the foregoing writers, and distinguishes the accidental from the essential symptoms of the complaint, can hesitate to agree with Dr. Cullen.

The peripneumonia notha is most apt to attack those advanced in life, and old people are more subject to it than those who are little past the middle of life. Women and others of a delicate habit are less subject to it than the robust. It is common in the full and phlegmatic, especially those who have indulged much in the use of fermented liquors, particularly distilled liquors, or have fallen into a bad habit of body from other causes. Those who have been subject to catarrhal affections, who are indolent, Quarin observes, and use too firm a diet, are particularly subject to peripneumonia notha, and may be attacked with it at an earlier time of life than that at which it usually appears. This, like the true pneumonia, seems often connected with the state of the liver, which is probably one reason why those addicted to the use of fermented liquors are subject to it.

The exciting causes of peripneumonia notha are similar to those of the phlegmasiæ. It is most prevalent in marshy countries, especially when the air is cold or liable to sudden changes of temperature; hence spring and autumn are the seasons at which it chiefly prevails, and it is equally occasioned by a change from heat to cold, or the contrary.

It is frequent during the prevalence of contagious catarrhs, which in the predisposed frequently terminate in peripneumonia notha. This complaint may be excited by all the various irritations applied to the lungs, which are mentioned as occasional causes of pneumonia.

Some remarks on the proximate cause, or in other words, on the nature of peripneumonia notha, which, from what has just been said, seems to differ so essentially from the phlegmasiæ, may be judged proper. The nature of peripneumonia notha, however, seems at present but little understood. We appear, indeed, to class together under this name complaints very different in their nature. Nor can this confusion be avoided till we are acquainted with some diagnostic which may point out whether the lungs are inflamed or not.

It is not difficult to conceive that a secretion into the bronchiæ may take place capable of impeding or even interrupting the office of the lungs where there is no inflammation. But how shall we distinguish such cases from those in which the same copious secretion and dyspnœa proceed from inflammation? Dr. Cullen, indeed, and some others maintain, that a degree of inflammation constantly attends this complaint; while others run into the opposite opinion, and deny that it ever is of an inflammatory nature. The truth seems to be, that where the perip-

pneumonia notha is exquisitely formed, if there is any inflammation it is of a very languid kind ; but in proportion as the symptoms approach to those of pneumonia, the inflammatory affection of the lungs becomes more apparent ; and a want of attention to distinguish these cases seems to have given rise to the opposite opinions respecting the nature of the complaint.

The chief difference between the true pneumonia and the peripneumonia notha arises, perhaps, from the greater laxity of fibre in those who are subject to the latter complaint, in consequence of which the effusion which takes place is so copious as either wholly to remove the incipient inflammation or to prevent it becoming considerable. If such be the case it would appear, from what was said in the Introduction to the Second Part respecting the nature of the profluvia, that the peripneumonia notha belongs to this class of diseases, rather than to the phlegmasiæ.

It is an opinion of Boerhaave and his Commentator Van Swieten, that peripneumonia notha is the effect of, and immediate cause of death in, almost all diseases which terminate fatally. By which we are to understand nothing more than that these authors apply the term to a certain train of symptoms which in most cases precede death ; a term certainly very ill chosen for this purpose, since they employ it at the same time as the name of a disease. We might as well say that all diseases terminating fatally occasion syncope, because the motion of the heart is enfeebled previous to death.

SECT. III.

Of the Treatment of Peripneumonia Notha.

THE treatment of this complaint varies in different cases according as the symptoms approach more or less to those of the true pneumonia. When the inflammatory symptoms in the peripneumonia notha are considerable, the treatment in the two complaints differs only in degree.

From the tendency to effusion, however, in all cases of this complaint, and the peculiar habit of body in which it appears, blood-letting must be employed with much caution. It is sometimes proper, indeed, to begin with a moderate blood-letting, but after the inflammatory symptoms have to a certain degree yielded, it is advisable to attempt the cure by an attention to diet, proper expectorants, and local evacuations alone. There are few complaints, indeed, in the treatment of which more caution is required, the inflammatory symptoms often urging the necessity of one set of remedies, while the tendency to effusion points out another of very opposite effects. All that can be done in such

cases is to study with care the nature of the symptoms and the habit of body, and obviate that tendency which seems more immediately to threaten danger, but at the same time in such a way as shall as little as possible increase the opposite train of symptoms.

The tendency to inflammation is to be obviated with as little loss of strength as the nature of the case admits of; and that to debility, by means which tend as little as possible to increase inflammation. After all that can be said, therefore, much must depend on the discernment of the practitioner.

Although Boerhaave, in laying down the treatment in this complaint recommends blood-letting, yet he afterwards dissuades from the employment of this remedy, as even while it brings immediate relief, it eventually increases the complaint; and Sydenham, who in most cases made so liberal a use of the lancet, acknowledges the bad effects of the repetition of blood-letting in peripneumonia notha.

Catharsis seems to be a safer evacuation in peripneumonia notha than blood-letting.

Dr. Cullen thinks the little advantage derived from, or rather, the injury done by, cathartics, in the true pneumonia, is a strong argument against their use in the complaint before us. Sydenham, on the other hand, assures us that, contrary to what happens in the true pneumonia, the free employment of cathartics is useful in peripneumonia notha. The result of general experience, however, seems to be, that mild cathartics, not too frequently repeated, and clysters only, are proper in this disease; for, although it is of great consequence to prevent irritating matter being lodged in the alimentary canal, much evacuation is found hurtful.*

Reasoning from the effects of medicines in the true pneumonia, we should be led to very erroneous conclusions respecting the propriety of emetics in this complaint. In peripneumonia notha, says Lieutaud, especially if it be accompanied with nausea, an emetic often brings considerable relief. "Full vomiting," Dr. Cullen observes, "may often be repeated, and nauseating doses ought to be constantly employed." The benefit derived from emetics and nauseating doses seems chiefly to consist in their increasing the expectoration, on the state of which, we have seen, the event of the disease so much depends. Nor is their tendency to promote sweat, which, if general and not profuse, nor brought out by heating measures, is for the most part favourable, to be overlooked. The other expectorants employed in this complaint do not differ from those recommended in the true pneumonia.

* Eller particularly recommends the use of emollient and gently stimulating clysters in this complaint. *De Cog. et Cur. Morb.*

The employment of opiates, however, is not always safe in the peripneumonia notha ; they act, we have seen, by interrupting for a time the efforts to expectorate, which, when the fluid poured into the lungs is copious and the strength much reduced, is attended with danger.

Little is to be expected from the medicines termed pectoralia, which were by some much recommended in peripneumonia notha, ground ivy, hyssop, &c. Nor is much more to be expected from the use of diuretics. They are recommended by Lieutaud and other writers of authority, and as many of them are innocent, it may not be wholly useless, perhaps, especially where the quantity of phlegm oppressing the lungs is very great, to make a trial of them.

With regard to the means of obviating debility, wine is found to increase the inflammatory tendency much less than any of the preparations of the bark, and it is often the more necessary in this complaint, as the subjects of peripneumonia notha are frequently such as have long been accustomed to the use of fermented liquors ; and, as Sydenham has justly observed, the sudden abstraction of the habitual stimulus is often attended with the worst consequences.

These observations, however, apply only to the cases which partake least of the nature of pneumonia. When the tendency to inflammation is apparent a stricter attention to the anti-inflammatory regimen is necessary. Irritating articles of food and such as are of difficult digestion are improper in all cases of peripneumonia notha, and in these animal food of every kind is to be avoided till the inflammatory symptoms have abated. In such cases, as the fever runs higher and the disease is more rapid, the change of diet is less felt than it would be in the mere chronic cases.

Such are the general means employed in peripneumonia notha. The local remedies hold a higher place in the treatment of this complaint than in that of pneumonia.

As we dread the effects of general, we endeavour to supply their place by a more assiduous use of local remedies. The chief of these still are local blood-letting and blisters. The former is employed where the disease approaches to the nature of pneumonia, the latter is useful in all cases, but, as in pneumonia, blisters should be confined to the thorax. Blistering the legs, as recommended by Eller and others, appears to be of little service. Fomentations of the chest are still less useful here than in pneumonia.

From the foregoing observations the reader will readily perceive the circumstances in which the treatment of peripneumonia notha differs from that of the true pneumonia.

CHAP. XII.

Of Carditis and Pericarditis.

ENOUGH has already been said of carditis and pericarditis to convince the reader that any particular consideration of these complaints is unnecessary. There is no symptom, we have seen, which can be depended on as forming a diagnosis between them and inflammation of the lungs. Were we possessed of such a diagnosis it would prove of little use, since the treatment when the heart, pericardium, or lungs, is inflamed is the same.

It is remarkable, indeed, that inflammation of the heart and pericardium has existed without betraying itself by any symptom; for abscesses and ulcerations of these parts have been found after death where none of the symptoms of inflammation had been observed. Of the treatment in such cases nothing can be said, since they are only known by their consequences, which are uniformly fatal.

How it happens that inflammation sometimes exists in these parts, unaccompanied by any of its usual symptoms, it is impossible to say. We shall find similar instances in some of the other phlegmasiæ, and these too where the inflammation attacks organs of much greater sensibility than the heart and pericardium.

We have now considered all the phlegmasiæ in which the inflammation is seated in the head, neck, and thoracic visera; and are now to consider those in which the inflammation attacks the abdominal viscera. The inflammation sometimes seizes on the whole of the peritoneum; the phlegmasia is then termed peritonitis.

It is defined by Dr. Cullen,

Fever, with pain of the abdomen, increased by the erect posture, and unaccompanied by the symptoms peculiar to the other abdominal phlegmasiæ.

The peritonitis, however, seldom exists without the inflammation spreading in a greater or less degree to the stomach and intestines, nor does inflammation of the latter frequently exist without extending to the peritoneum. There is hardly room, therefore, for regarding the peritonitis as a distinct complaint. When it does appear alone, it may easily be known by comparing the symptoms just enumerated with what is about to be said of those of the other abdominal phlegmasiæ, and the mode of treatment is the same as in inflammation of the stomach and intestines.

CHAP. XIII.

Of Gastritis.

INFLAMMATION of the stomach is defined by Dr. Cullen,

A typhus fever, with heat and pain in the epigastrium, increased by any kind of ingesta, with a constant inclination to vomit, (whatever is received into the stomach being immediately rejected) and hiccup.

The first part of this definition is objectionable. The fever in gastritis bearing no resemblance to typhus, except in the general debility which attends it, for even the pulse, if we except its feebleness, is very different from that in typhus, and as for the more marked symptoms of typhus they never shew themselves in this complaint. This objection, it is evident, is obviated by the change above proposed in the definitions of the phlegmasiæ.*

Dr. Cullen divides gastritis into two varieties, the gastritis phlegmonadea and gastritis erythematica. Of this division I shall presently have occasion to speak more particularly.

SECT. I.

Of the Symptoms of Gastritis

THE symptoms of gastritis, like those of most other phlegmasiæ, are far from being complicated, the definition just given comprehending the chief part of them. The pain of the stomach is generally very severe and accompanied with a sense of burning heat. It is not always confined exactly to the region of the stomach, but extends as low as the false ribs, and often shoots to the back. It is not only much increased by any thing received into the stomach, but even by the slightest external pressure. The inclination to vomit and the hiccup are very constant attendants.

The pulse is frequent, small, contracted, more or less hard, and sometimes intermitting. Burserius observes, that the pulse is sometimes rather strong; this, however, is comparatively rare. The thirst is urgent, and it forms an exception to what has just been said respecting ingesta, that on receiving a mild fluid into the stomach the pain seems for a few moments to abate. In a very short time, however, the fluid is rejected, and the patient soon finds that any relief obtained by drinking more is deceitful and transitory.

* General Introduction vol. 1.

In gastritis there is a more sudden and general depression of strength than in any other of the phlegmasiæ. It generally goes so far as to threaten syncope, which in many cases actually happens. The anxiety and anguish referred to the precordia are very great and sometimes among the most distressing symptoms.

The bowels are costive ; there is seldom, however, much difficulty in moving them, unless the inflammation has spread to them.

There is no complaint with which, by a person acquainted with its symptoms, gastritis can be confounded. In cramps and flatulent pains of the stomach the pulse is generally natural or nearly so, nor are the latter accompanied with the sudden sinking of the strength which attends gastritis. In these there is often no vomiting, and it is very rarely so constant, or so constantly excited by the ingesta. The increase of pain on receiving any thing into the stomach is much less remarkable in flatulent pains and cramps than in gastritis, and in the former the great increase of pain on pressure, one of the best diagnostics of gastritis, is not observed. The hiccup too, which is a more constant attendant on the latter complaint, assists here in distinguishing it.

Besides, in spasm of the stomach, the case most frequently confounded with gastritis, there is such a sense of contraction and suffocation that the voice is often suppressed, while in gastritis it is more free and the cries of the patient are often piercing.

According to Sauvages, (and Quarin seems to agree with him) it is almost impossible to distinguish gastritis from an inflammation of the epigastric muscles, in which, it is said, all the symptoms of the former are present in a less degree. By a little attention, however, the cases may be readily distinguished. The pain, as in gastritis, indeed, is increased on pressure ; but it is also increased, and in a greater degree, by motion, that is, by those motions in which the epigastric muscles are concerned, which is not the case in gastritis. The state of the pulse in the former case also is very different. If affected at all, instead of being small and feeble as in gastritis, it is strong as in most other phlegmasiæ. Besides, there is little or no tendency to vomiting in this case and some degree of swelling of the muscles may frequently be observed ; this symptom, however, is not constant and there is often some degree of fulness about the stomach in gastritis.

Quarin observes, of the inflammation of the epigastric muscles, that a diagnosis between it and gastritis is of little consequence, since the practice in them is the same. This remark, however, is far from being well founded. The greater importance of the organ affected in gastritis renders the most powerful means necessary. In the other we trust more to local means, its

treatment resembling that of the false pleurisy. They are complaints of precisely the same nature.

Such are the usual symptoms of gastritis, and the means of distinguishing it from the complaints which most resemble it; and when it appears with these symptoms there are few complaints whose diagnosis is more easy. This, however, is not universally the case; there are instances on record in which it appeared on dissection that the stomach had been inflamed where many, and indeed almost all, the foregoing symptoms were absent. De Haen, in his *Ratio Medendi*, relates several cases of this kind; in one there was no vomiting, and the patient retained his appetite to the last; in another, not only the vomiting but the pain itself was absent; such cases, however, are not to be looked for.

I have already observed, that Dr. Cullen divides gastritis into two species, the phlegmonic and erythematic. He is far, however, from defining accurately these terms, or pointing out the means by which his two species may be distinguished. He seems to suppose that two kinds of inflammation, analogous to the pustule and erythema of the skin, may exist in the stomach. The one superficial, the other deep-seated. This supposition, we have reason to believe, is well founded, although a more accurate knowledge of the complaint than we possess is necessary for distinguishing the two species. It is the gastritis erythematica, which Dr. Cullen thinks is often present without the symptoms which characterize gastritis. Erythematic inflammations of the stomach, he observes, are more frequent than the phlegmonic. Wherever this inflammation affects the mouth and fauces, and there is at the same time in the stomach an unusual sensibility to acrid substances, with frequent vomiting, there can be little doubt, he thinks, that the inflammation has spread to the stomach. And these symptoms, with loss of appetite, thirst, and a frequent pulse, even where there is no affection of the mouth and fauces, often indicate an erythematic inflammation of the stomach, which after such symptoms frequently shews itself in the fauces.

But even where the inflammation is of the erythematic kind, the symptoms are often such as Dr. Cullen supposes to characterize the phlegmonic inflammation of the stomach; for I have seen the erythema spread from the mouth to the stomach, and there occasion all the usual symptoms of phlegmonic gastritis. They were, however, I think, less violent; but it is evident that a greater or less degree of the same symptoms cannot serve the purposes of a diagnosis.

The erythematic inflammation in internal parts, as well as on the surface, shews a tendency to spread, leaving those which it first occupied, when it affects neighbouring parts, and in this way

it often extends along the whole alimentary canal. In the intestines, contrary to the effects of phlegmonic inflammation, it occasions diarrhœa, and the vomiting frequently ceases as the diarrhœa comes on.

We sometimes meet with other symptoms in gastritis besides those which have been enumerated. These, however, are less frequent. The most common of them is dyspnœa. The patient often complains of a difficulty of breathing, which does not arise from the inflammation having spread to the lungs, (when this happens the other symptoms of pneumœnia as well as the dyspnœa attend) but from the inflammatory state of the stomach rendering the descent of the diaphragm painful. It is evident the degree of dyspnœa attending gastritis must in a great measure depend on the part of the stomach which the inflammation occupies. The nearer the seat of the complaint is to the diaphragm, the more, it is evident, will the descent of the latter be affected by it.

Another symptom, less readily accounted for, which now and then appears in gastritis, is the hydrophobia. The reader will find a case of gastritis attended by this symptom in the first volume of the Medical Essays. He may also consult Van Swieten's Commentary on the 1130th and 1139th Aphorisms of Boerhaave. Hydrophobia, indeed, occasionally supervenes in various acute diseases.

Resolution, a tendency to which, in this as in other cases of phlegmasia, is known by the general mildness of the symptoms, and particularly by their yielding to the proper remedies, is the only favourable termination of gastritis. When the symptoms run high, and suffer little or no remission on the use of blood-letting, and other means for moderating inflammation, we have reason to dread an unfavourable termination.

A tendency to suppuration, which is a rare termination of gastritis, is known by the symptoms continuing without any considerable remission, and at the same time with no great degree of violence for one or two weeks or longer. When an abscess is formed there is a considerable remission of the pain, generally preceded by rigours. But a sense of weight about the precordia and much anxiety harrass the patient, a change of symptoms analogous to that above described indicating suppuration in pneumœnia. The febrile symptoms which attend all internal suppurations are the same. They are at first more moderate than those which accompany the inflammatory stage of the complaint; in a short time, however, they begin to suffer regular exacerbations, and by degrees assume the form of hectic fever, of which I shall soon have occasion to speak at greater length.

The danger of an abscess in the stomach is evident. It generally proves fatal unless it open into the stomach, in which case

the pus is discharged by vomiting and stool, and the ulcer sometimes heals. In the *Memoirs of the Academy at Paris*, for the year 1704, the reader will find a case, in which, although the abscess burst into the stomach, the patient died in consequence of the ulcer left by it. Eller relates a similar case in his *Obs. de Cog. et Cur. Morb.* in which the patient lived several years after the formation of the ulcer. Such cases sometimes terminate suddenly by the ulcer causing a fatal hemorrhagy. There are instances on record in which the inflammation having caused an adhesion between the stomach and parietes of the abdomen, the abscess broke externally. Van Swieten mentions more than one case of this kind. One from the *Journal des Scavans*, in which the contents of the stomach were discharged through the opening, so that it was necessary to keep it closed by compresses and bandages. The patient lived under these circumstances for no less a time than twenty-three years, and enjoyed so good a state of health that she was able to undergo considerable labour in gaining a livelihood. When the abscess, as frequently happens, bursts into the cavity of the abdomen, it occasions purulent escites, which always proves fatal.

The tendency to gangrene in this complaint, as in other internal inflammations, is known by the unusual violence of the symptoms, and by their not yielding to the proper remedies. It is almost unnecessary to observe, that in gastritis gangrene always proves fatal in a very short time. When gangrene actually takes place its presence is known by the remission of the pain, the pulse at the same time becoming more frequent and feeble, and the anxiety and debility increasing, with cold, clammy, and partial sweats. I have already had occasion to observe, that in visceral inflammations, where the gangrene occupies but a small part of that which is inflamed, the pain, as I have myself witnessed, often continues to the last. In these circumstance it is more difficult to ascertain its presence. This may generally be done, however, by an attention to the other symptoms.

Boerhaave ranks schirrus and cancer of the stomach among the terminations of gastritis. But the generality of writers agree that these are rarely, if ever, the consequence of inflammation.

Besides the terminations which gastritis has in common with the other phlegmasiæ, it seems sometimes to prove fatal merely in consequence of the extreme irritation of the system which it occasions. "From the sensibility of the stomach, and its communication with the rest of the system," Dr. Cullen observes, "it would seem that the inflammation of this organ, by whatever causes produced, may be attended with fatal consequences; in particular, by the great debility which such inflammation suddenly produces, it may quickly prove fatal without running the common course of inflammations." And Boerhaave,

in his 953d Aphorism, after enumerating other terminations of gastritis, observes, that it sometimes induces sudden death with convulsions, before any of these terminations can take place.

General convulsions are mentioned by many as a frequent symptom of gastritis ; and that they sometimes proceed from the presence of inflammation in so sensible a part cannot be doubted ; for this we have the authority of Quarin, Burserius, and others ; but in by far the majority of cases in which they supervene, the disease has arisen from poisons received into the stomach, and the convulsions are more frequently the consequence of these being taken into the mass of blood, than of the gastritis, which they occasion. The combination of gastritis and worms in children may also have contributed to strengthen the opinion of convulsions being a symptom of the former complaint.

SECT. II.

Of the Causes of Gastritis.

The state of the body which predisposes to gastritis is the same as that which predisposes to other inflammatory complaints. I have already had occasion to remark, that, independently of plethora, which certainly disposes to the phlegmasiæ, there is a habit peculiarly subject to them. "Those," Dr. Millar remarks, "of a thin make, rigid fibres, and a quick digestion, are liable to "inflammatory diseases." It is unnecessary to repeat the remarks which have been made above respecting the mode of life which predisposes to inflammation.

Among the occasional causes of gastritis, as of the other phlegmasiæ, cold applied in various ways holds a principal place. Most of the exciting causes of gastritis, however are local irritations applied to the stomach. There is no cause of this disease so common as the receiving cold liquors into the stomach in considerable quantity when the body is heated. Acrid matters received into the stomach, especially when its mucus has been abraded or so changed as not properly to perform its office, may excite gastritis. It is to be recollected that the substances most acrid to the taste are not those which occasion most irritation in the stomach. The strongest spices are often received into the stomach without inconvenience, while, on the other hand, the most insipid matters frequently affect it most powerfully. All substances, however, which strongly affect the taste, to a certain degree irritate the stomach, and if used very freely by those who are strongly predisposed to gastritis, particularly such as have lately laboured under this complaint, they may excite it. It is almost unnecessary to observe, that all cathartics, as well as emetics,

possess a peculiar power of irritating the stomach. There are few cathartics which, if given in very large doses, do not prove emetic. It is not surprising, therefore, that we find the use of drastic emetics and cathartics ranked amongst the causes of gastritis. To the same division of its causes belong also a numerous class of poisons, a large proportion of which seem to act chiefly by exciting inflammation and ulceration in the stomach. There are certain articles of diet which occasion more irritation during digestion than others. Animal food occasions more than vegetable, and the flesh of old animals more than that of young. The tendency of irritating and intoxicating liquors to excite gastritis is generally admitted. The liberal use of fermented liquors often excites it in those who are least predisposed, and a very small quantity is sufficient to occasion a relapse. Gastritis may arise from acrid matter generated within the body, as frequently happens in various ulcerous affections of the fauces and œsophagus. Dr. Cullen thinks, that gastritis occasioned by the application of acrid substances is generally of the erythematic kind.

There are few things which apply a stronger irritation to the stomach than over distention. When food is received into it in unusual quantity, and at the same time happens to be of difficult digestion, so that the distention is kept up for a considerable length of time, gastritis may be the consequence. The reader will find some good observations on this cause of gastritis, and cases illustrating them, in Eller's *Treatise de Cog. et Cur. Morb.*

A blow in the region of the stomach, or wound in the stomach or neighbouring parts, the pressure of the ensiform cartilage when a luxation of it takes place or it is broken, so that it presses on the stomach, excite this disease.

Like the other phlegmasiæ, it may be excited by the various causes of sudden plethora, particularly the suppression of hemorrhagies or other habitual evacuations.

It is not uncommon for the inflammation of some neighbouring parts to spread to the stomach, particularly that of the œsophagus and duodenum.

Such are the chief occasional causes of gastritis. There are some others whose operation seems wholly involved in obscurity. I have more than once had occasion to observe, that certain pestilential fevers are very generally accompanied with inflammation of the stomach and bowels, and so frequent is this combination that Van Swieten and others have supposed that the contagion often makes its first attack on the stomach, occasioning an inflammation of this organ. This supposition, however, is far from satisfactory, since the inflammation frequently does not shew itself till after the fever has lasted for many day. Besides, it

is not uncommon for gastritis to supervene on fevers which we have every reason to believe did not arise from contagion.

Gastritis supervenes in eruptive as well as simple, and in intermitting as well as continued, fevers. In the eruptive fevers it is most apt to supervene on the sudden disappearance of the eruption ;* and in such cases, probably from the great debility which attends them, it generally runs very speedily to gangrene.†

Among the complaints which are apt to give rise to gastritis, is generally mentioned the gout. When we come to consider this complaint, however, we shall find reason to believe that it rarely, if ever, excites visceral inflammation.

SECT. III.

Of the Treatment of Gastritis.

THE treatment of gastritis is so similar to that of several complaints we have been considering, that it will not be necessary to speak of it at great length. There are some circumstances peculiar to gastritis which deserve attention.

In this, as in the other phlegmasiæ, blood-letting is the remedy on which we depend, and there is no case in which it is carried to greater extent than in gastritis. We even read of cases in which it was employed four or five times a day for several days together. As soon as the symptoms of gastritis shew themselves we have recourse to this remedy, and if they do not yield it must be carried as far as the habit will bear. And so far from only letting blood when the pulse is full and strong, the smaller and weaker it is, with certain exceptions I am about to point out, copious and early blood-letting becomes the more necessary. And as in the cases in which we have hitherto found blood-letting necessary, we employ it with a view to diminish the strength of the pulse, in this instance it is recommended in order to increase its strength, and however singular it may seem, it uniformly has this effect, at least when it is about to prove serviceable. The feebleness of the circulation in gastritis increases the danger of delaying blood-letting, for it sometimes happens, even in the space of a few hours, that the circulation becomes so languid, as I have myself seen, that it is impossible to procure a flow of blood from any vein in the body.

In some rare cases it happens, as was observed above, that the pulse in gastritis is strong ; in these the usual effects of blood-letting are to be expected.

* Dr. M'Bride's Practice of Medicine.

† See what was said of the retrocession of eruptions, in the 2d vol.

However valuable a remedy blood-letting is in most cases of gastritis, there are some in which its propriety is questionable. When the strength has been much exhausted before the attack of the disease, as when this disease supervenes in the worst forms of typhus, blood-letting seems often to hasten death, although instances are not wanting in which even under these circumstances it has proved useful, but the peculiar circumstances under which it ought to be employed in such cases have not been ascertained. Of this, however, there can be no doubt, that it should not be employed in any case of this kind till after less debilitating means have failed.

We are also dissuaded from general blood-letting in gastritis when its continuance has occasioned symptoms of great debility. We must abstain from blood-letting when the pulse has become unequal, or when convulsions, syncope, and sonorous deglutition have supervened. These symptoms are rare, at least before a very late period of the disease.

Nothing affords a better prognosis in gastritis than the remission of the symptoms on the employment of blood-letting. But we must not mistake such a remission for a removal of the complaint. In a large proportion of cases, after the first blood-letting, an exacerbation sooner or later takes place, demanding a repetition of the same remedy.

The repetition of the blood-letting is regulated in the same manner as in the other phlegmasiæ. The less remission the symptoms suffer after the first blood-letting, the sooner, and to the greater extent, it must be repeated. With regard to the evacuation by the bowels, the very irritable state of the stomach prevents our giving medicines by the mouth, which in most cases of this complaint serve only to increase the vomiting, and consequently the disease. The general rule, therefore, is to give no cathartic by the mouth; to which, however, there are exceptions. Gastritis, it has been observed, is sometimes induced by over distention of the stomach. Nothing tends more than this to debilitate muscular action. If the urine, for example, be retained till the quantity accumulated has greatly distended the bladder, it has no longer power to expel it. The same happens to the stomach, when it is over distended it loses its power to expel its contents by vomiting, for although the stomach is assisted in vomiting by the abdominal muscles and diaphragm, yet it would appear that the action of the muscular fibres of the stomach itself are necessary in this operation. Hence it is, that in gastritis occasioned by over distention, the patient is often tormented by ineffectual efforts to vomit. Little is to be expected, it is plain, from any remedy while the cause which produces the disease still remains applied. In such cases, therefore, at the same time that we employ the usual remedies of gastritis, it is necessary to have recourse to some means, in part at least to expel the

contents of the stomach. Clysters tend certainly to this effect, but not very powerfully. Emetics and cathartics taken by the mouth are the only effectual means, both of which are inadmissible in ordinary cases. Nothing, it is evident, can occasion more irritation of the stomach than an emetic, when it is so loaded that the ordinary efforts of vomiting cannot expel its contents. The only effectual way of relieving the stomach which remains is by the exhibition of cathartics by the mouth, which have often under such circumstances proved eminently serviceable, by promoting the passage of the offending matter through the pylorus.*

While cathartics are employed for this purpose, the intestines, at the same time, should be excited by clysters. By these means part of the contents of the stomach will pass into the intestines, and the unusual load being thus lessened, its remaining contents will be rejected by vomiting.

Another instance in which medicine must be given by the mouth in this complaint is, in the case of acrid or poisonous substances having been received into the stomach. It is necessary in these cases to promote the vomiting by the use of mild mucilaginous and oily fluids, till there is reason to believe that the offending cause is removed. While these promote vomiting, they defend the stomach against the irritation of its contents. Cathartics are particularly indicated if the poison has been long enough in the body to give reason to believe that it is passed into the intestines. They should be given in small compass, and in the form of pills, that they may, if possible, be retained. In these circumstances it is evident, that the frequent repetition of cathartic clysters is proper. While they expel the contents of the lower bowels, they increase the peristaltic motion of the whole alimentary canal. If we are acquainted with any substance which corrects the noxious quality of the poison, immediate recourse must be had to it. On this part of the subject I had occasion to make some observations in the first volume, in speaking of arsenic as a remedy in intermitting fever, to which I refer. With these exceptions, no medicine should be given by the mouth in gastritis. In ordinary cases we promote the evacuation by the intestines by clysters alone.

Even where diarrhœa attends, mild mucilaginous and oily clysters are serviceable, both by promoting the evacuation of any irritating matter which the intestines may contain, and in consequence of allaying irritation, by tending to lessen the diarrhœa when it threatens to become profuse.

The urgent thirst, and duration of the disease, for gastritis when it suffers remission sometimes lasts for several weeks, render an attention to diet necessary. The patient ought not to be tormented by constant thirst, but at the same time he must be

* See the observations of Eller on this complaint, in his *Treatise de Cog. et Cur. Morb.*

restricted both in the quantity and quality of what he drinks. The mildest fluids must be chosen, and given frequently and in small quantity, so that they may as little as possible increase the vomiting, which with all the care that can be taken they seldom fail to do.*

The food must be regulated on the same principle. For the first days, indeed, a total abstinence from food is best ; but when the disease continues longer, it is necessary to support the strength by small quantities of the mildest kinds. Any solid food irritates too much. The mild and mucilaginous decoctions are the best.

We are cautioned against endeavouring to stop vomiting in gastritis by any preparation of opium. The impropriety of giving opium at the commencement is apparent. In the advanced stages, however, after the force of the disease has been broken by proper evacuations, anodyne clysters cautiously employed sometimes allay the vomiting, and tend to shorten the disease.

It seems to have been overlooked by many writers, that the bad effects of opium in the phlegmasiæ proceed not from any local action of the opium on the inflamed part, but from its increasing the vis a tergo. When this has been sufficiently reduced, and there is consequently little or no hardness remaining in the pulse, opium is often employed, for the purpose of allaying pain and irritation, with great advantage.

The temperature of the patient's chamber, as in the other phlegmasiæ, should be as uniform as possible, and rather cool than otherwise.

Such are the general remedies employed in gastritis. When it supervenes on the retrocession of eruptions, some other means are necessary. These I have already had occasion to point out in treating of the exanthemata. It remains to make some observations on the local means employed in gastritis.

Local blood-letting is seldom recommended in this complaint, although the same good effects are to be expected from it as in the other phlegmasiæ. It is peculiarly well adapted to those cases in which general blood-letting to any extent is inadmissible, or at least an ambiguous practice.

Blistering is more generally recommended, and ought never to be omitted after the hardness of the pulse is reduced by blood-letting.

Fomentations are more frequently employed in abdominal in-

* Many recommend the addition of acids and nitre to the drink : These, particularly the latter, are serviceable in most cases of phlegmasiæ, but in gastritis nitre would increase the vomiting.

inflammations, than in those of the thoracic viscera. The constant motion of the body, however, which often renders it very difficult to retain even blisters in their proper place, generally renders the fomentation of the abdomen extremely troublesome. Besides, this remedy is apt to increase the anxiety, one of the most distressing symptoms of gastritis; so that upon the whole it often does more harm than good.

When the symptoms of suppuration make their appearance, medicines can be of little further use; and if the patient is saved, it is more by the accidental seat of the abscess than by any thing that the physician can do. If the abscess bursts into the stomach, irritating articles of diet should be avoided till the ulcer is healed. When the bursting of the abscess forms an external ulcer, the treatment must be left to the surgeon. In this case, indeed, little is to be done besides employing the means necessary to prevent the contents of the stomach from being discharged by the wound.

When the matter is discharged into the cavity of the abdomen, there are no means of relief. The same observation applies to gangrene of the stomach, so that when its symptoms supervene, we desist from the use of medicine.

It has been observed, that gastritis sometimes assumes a remitting form; in these cases the Peruvian bark has been recommended. It has not, however, been ascertained with accuracy in what cases it is proper.

Dr. Cullen takes no notice of the inflammation of the spleen, pancreas, or omentum, either in his *System of Nosology*, or his *First Lines*. From the situation and office of these parts, it is impossible for us to distinguish inflammation of them from that of neighbouring parts. The functions are so obscure, that any lésion of them produces no sensible effect. The spleen has even been cut out in brutes, or the vessels going to and coming from it secured by ligature, without materially affecting the health of the animal.* And there are many cases on record, where parts of the omentum have been lost in consequence of wounds, and the patient has afterwards enjoyed good health. Nay the omentum has been found almost wholly wanting in people who died suddenly at a time when they appeared in perfect health.† Hence it often happens, that inflammation of the spleen, pancreas, or omentum, are mistaken for inflammation of neighbouring parts. Thus Van Swieten relates a case, sent him by De Haen, in which inflammation of the spleen was mistaken for pleurisy. Inflammation of the pancreas is often mistaken for gastritis; and inflammation of the omentum may be confounded with enteritis. It sel-

* See Malpig. de Liene, Brunner de Pancreate.

† See the Anatomical Works of Ruysch.

dom happens that any of these parts are affected with inflammation without some of the neighbouring parts partaking of it, which adds greatly to the difficulty with which we detect the chief seat of the complaint. It fortunately happens, however, that an accurate diagnosis in such cases is of no consequence, the mode of practice being the same in inflammation of the spleen and of the lungs, in that of the pancreas and stomach, and in that of the omentum and intestines. All that is necessary is, to suit the practice to the severity of the symptoms.

The phlegmasia which next demands attention then is the Enteritis, or inflammation of the Intestines. On this complaint so similar in its symptoms and mode of treatment to gastritis, a few observations will be sufficient.

CHAP. XIV.

Of Enteritis.

EENTERITIS is defined by Dr. Cullen,

A typhus fever with a pungent pain of the abdomen, accompanied with a sense of twisting about the umbilicus, vomiting, and obstinate costiveness.

He divides this complaint in the same manner as gastritis, into the enteritis phlegmonodæa, and enteritis erythematica.

The former he defines, enteritis with acute pain, violent fever, vomiting, and costiveness.

The latter, enteritis in which the pain and fever are less violent, accompanied by diarrhœa, without vomiting. This form of the disease is with little propriety arranged under the general definition of enteritis, of which vomiting and costiveness form a part. It is far from being certain, however, that the erythematic enteritis always assumes this form. Although there can be little doubt of an enteritis, as well as gastritis erythematica, really existing, yet in the present state of our knowledge we cannot with much accuracy distinguish them. "Although I have mentioned these species," Dr. Cullen observes "it must be confessed, that the symptoms of erythematic gastritis, and still more those of erythematic enteritis, are very uncertain and obscure. I wished, however, to propose this division, that future practitioners may enquire into the propriety of it with more diligence." The first part of the definition of enteritis, typhus fever, is objectionable for the same reason that it was objected to in the definition of gastritis.

SECT. I.

Of the Symptoms of Enteritis.

IN enteritis the patient complains of an acute burning pain in the abdomen, sometimes confined to a particular part, at other times felt more generally, and particularly about the umbilicus. Although it does not intermit, it becomes more severe at intervals, which has, with much probability, been attributed to the contents of the intestines now and then passing over the inflamed part. It is one of the best diagnostics of the pain attending enteritis, that it is greatly increased on pressure. Other pains of the abdomen are, to a certain degree, increased on pressure, but none so remarkably as that which accompanies the inflammation of the stomach, bowels, and peritoneum.

As enteritis advances, the abdomen becomes more or less tumid; and in by far the majority of cases obstinate costiveness attends throughout the disease. We have seen diarrhœa enumerated among the symptoms of erythematic enteritis, in which all the symptoms are more mild than in the phlegmonic. Even in the best formed cases of enteritis a thin matter is sometimes past by stool. There is frequently present a considerable degree of nausea, and in many cases the patient is harrassed with vomiting. The inverted motion of the stomach is sometimes communicated to the intestines, and extends so far along their course that feculent matter is rejected by vomiting.

These symptoms are accompanied with a considerable degree of fever. The pulse is frequent, small, and hard, as in gastritis. Some writers assert, that the pulse is sometimes full in this complaint as well as in gastritis. It is certainly very rarely so either in the one or the other. The pulse is never so frequent either in this complaint or in gastritis as it frequently is in typhus. It seldom much exceeds a hundred. I have seen a case of gastritis and enteritis combined, so violent that it terminated fatally in about twenty-four hours, in which the pulse at the height of the disease did not exceed ninety-two.

The heat is considerable, the thirst urgent, and urine high coloured.

The remarkable depression of strength observed in gastritis, also attends enteritis, but in general it is neither so sudden nor excessive.

It is not always very easy to distinguish enteritis from other visceral inflammations; and as in this, as in similar cases, the inflammation often spreads to neighbouring parts, it is frequently impossible to ascertain its chief seat. When the upper part of the

colon is the part affected, the symptoms often resemble those of pleurisy or hepatitis. When it is confined to the rectum, it produces tenesmus, constriction of the anus, and other symptoms of piles, for which it is frequently mistaken. Even in this case, however, the difficulty of the diagnosis will seldom lead to any material error in practice, for when piles are attended with considerable pain and fever, we must have recourse to the measures which obviate inflammation. In such cases, indeed, piles are always attended with more or less inflammation of the rectum.

We judge of the tendency of this complaint by the degree of the symptoms, and the effects of the means employed. But there are also some other circumstances which demand attention in collecting the prognosis. It is more dangerous when it occupies the small than the large intestines; and upon the whole, the nearer its seat approaches the stomach, the greater is the danger. There is some difficulty in ascertaining what part of the intestine is inflamed. This is to be attempted by attending to the seat and degree of the pain, the degree of nausea and vomiting, and the sinking of the strength; for all these symptoms are more violent when the disease is seated in the small than in the large intestines, and in proportion as the seat of the complaint is nearer the stomach. When the inflammation is in the rectum, we are further assisted in determining its seat by the pain and constriction of the anus. When the inflammation is seated in other parts of the large intestines, we may readily be deceived, for, from the vicinity of the stomach, the nausea and vomiting are often considerable if it occupies the higher parts of the colon. We shall not err, however, in the treatment of the disease, if, without endeavouring to ascertain its precise seat, we proportion the vigour of the means employed to the violence of the symptoms.*

I have already had occasion to observe, that the symptoms are milder in the cases attended with diarrhœa, than where there is obstinate costiveness. In the former case consequently the prognosis is better. As in other visceral inflammations, the prognosis depends as much on the habit of the patient as on the degree of the disease. From the nature of the means which relieve such complaints, the danger is always great when they supervene on debilitated states of the body. When enteritis supervenes on the worst forms of typhus, which it is apt to do, it generally proves fatal. This complaint is particularly dangerous, Quarin observes, in pregnant women, from the probability there is that it may occasion abortion; besides the constipation, vomiting, and all the other symptoms, are generally very violent in them, and the danger is increased by the abdominal viscera being compressed by the distended uterus.

* See the 22d section of the 43d Epistle of Morgagni de Causis et Sedi-
bus Morborum.

Resolution may be regarded as the only favourable termination of enteritis. It is frequently preceded by a moderate diarrhœa, the most favourable symptom in this disease.

When the rectum is the seat of the inflammation, it is often relieved, or wholly removed, by the hæmorrhoids.

The tendency to suppuration and gangrene in this complaint, is known by the same symptoms as in gastritis. Suppuration is even a more rare termination of inflammation of the bowels, than that of the stomach. When the symptoms, however, have continued moderate for many days, without yielding to the employment of remedies, this termination is to be dreaded, and if irregular shiverings supervene in such a case, and the patient complains of a sense of weight, and an obtuse, instead of the acute pain, which accompanies the inflammatory stage, there will be little doubt of an abscess being formed. The consequences to be feared from such an abscess are similar to those which follow an abscess of the stomach, except that the former seldom or never bursts externally. If it bursts into the cavity of the intestines, it produces a purulent diarrhœa; and as the ulcer is rarely cured, the coats of the intestines frequently slough off and are discharged by stool. The patient is wasted by hectic fever, and suffers a lingering and painful death. When the abscess bursts into the cavity of the abdomen, it forms, as in the case of gastritis, the purulent ascites.

There is, perhaps, no inflammation so apt to terminate in gangrene as enteritis. The tendency to gangrene is known here, as in the other phlegmasiæ, by the unusual violence of the symptoms, and by their not yielding to any remedy. The actual presence of gangrene is known by the pulse intermitting, the body being covered with a cold sweat, by thin ichorous, often livid or black stools passed involuntarily, hiccup, loss of sight, fainting, &c. under which symptoms the patient soon expires. The observations made, when we were speaking of gastritis, respecting the pain not always ceasing upon the commencement of gangrene, are applicable here.

It was observed of gastritis, that it often induces death without the inflammation terminating in any of its usual ways. The same is true of enteritis. The sensibility and importance of the stomach and intestines are such that the mere irritation and læsion of function, occasioned by an inflammation of these parts are often sufficient to destroy life.

Such are the symptoms of enteritis. But we meet with rare instances of this complaint, as well as of gastritis, unaccompanied by the symptoms peculiar to it. To distinguish such cases is attended with much difficulty. Morgagni enumerates some symptoms from his own experience, as well as that of others, by

which they may now and then be distinguished.* There is commonly something peculiar in the pulse, the abdomen is hard and swelled, and generally in some degree painful, particularly on being pressed. It has been remarked, that there is something peculiar in the countenance, which, however, is different in different cases. The eyes are staring, and the parts about the lips livid. The tongue is often foul, and the thirst considerable. I have met with several cases resembling these, in which, however, the inflammation seemed seated in the peritoneum; they were of a chronic nature, and generally yielded to local blood-letting and blistering with gentle cathartics.

When we were speaking of inflammation in general, it was observed, that gangrene of external parts sometimes supervenes without previous inflammation. Many have thought that this now and then happens in internal parts, particularly in the intestines, which may serve, perhaps, to account for some of the anomalous cases of the disease. Inflammation of the intestines sometimes produces a real volvulus or intussusceptio. It is probable, that this has taken place when part of the gut sloughs off. The patient may survive the sloughing of the internal coat although no intussusceptio has taken place.

SECT. II.

Of the Causes of Enteritis

ALL the causes of gastritis above enumerated may excite enteritis. The latter is more readily produced by cold applied either to the extremities or the abdomen. It is less readily excited than gastritis by acrid ingesta. This cause is most apt to excite inflammation in the small intestines; both because it is first applied to them, and because the small intestines are more liable to inflammation than the large, which has been ascribed to their greater delicacy; the contents of the large intestines being of a more irritating nature.

There are some causes which more particularly belong to enteritis, accumulation of the fæces, spasmodic colic, certain states of the bile, concretions forming in various parts of the intestines, herniæ, and volvulus.

A deficiency of the omentum is also ranked among the causes of enteritis. Nor is this surprising, says Quarin, since by the omentum the intestines are covered, fomented, and lubricated.

* See Boerhaave's Aphorisms on this disease, Van Swieten's Commentaries on them; Sir J. Pringle's Account of the diseases of the Army; Morgagni de Causis et Sed. Morb. Epist. xxxv; De Haen's Ratio Med. vol. iv.

SECT. III.

Of the Treatment of Enteritis.

THE remedy on which we chiefly rely in enteritis, as in other visceral inflammations, is blood-letting. The observations we make respecting the extent and repetition of blood-letting, in speaking of gastritis, are in every respect applicable here.

Catharsis is more generally employed in enteritis than gastritis, and as the nausea and vomiting are often less urgent, we have an opportunity in most cases of exhibiting cathartics by the mouth, which should never be neglected, but we must proceed cautiously, and recommend such cathartics as are least apt to offend the stomach. The saline and mercurial cathartics seem particularly well adapted to this complaint. The latter should be given in combination with other cathartics, which render its operation both more certain and more easy. The employment of cathartics by the mouth should not prevent the use of mild clysters, which both soothe the pain and tend to secure the operation of the cathartics. Blood-letting should precede the cathartic, that time may not be lost, and because it is not only the more powerful medicine, but a gentle cathartic, after the inflammatory disposition is moderated by blood-letting, will operate with more certainty than a powerful one where this remedy has not been employed. And this observation is also applicable to clysters.—When the nausea and vomiting are considerable, we often find it as impossible here, as in gastritis, to give any thing by the mouth; clysters must then be used more frequently and composed of more cathartic materials.

Clysters in enteritis should not be so bulky as greatly to distend, which always irritates the intestines, and they should be given cautiously, that the large intestines may not be injured by sudden distention, nor the small by compression. By these means the clyster will be more readily retained, and consequently better calculated to move the bowels. Even when enteritis is attended with diarrhœa, the injection of mild mucilaginous and oily fluids is generally serviceable.

The observations made respecting the use of opium in gastritis might be repeated here. Some practitioners speak of the employment of opiates even at an early period of enteritis as a safe practice. “I have often seen antispasmodics,” Dr. Gibson observes, “and particularly opiates, successful in removing this disease.”* There is every reason to believe, that those who make such observations have confounded other pains of the bowels with enteritis, which has frequently been done. Sir John Pringle recommends opium to be given with cathartics, for the purpose of

* Dr. Gibson's Treatise on Fevers.

enabling the stomach to retain them. This, particularly at an early period, is a very questionable practice ; and on comparing the definition of this disease, which Sir John Pringle, following the Ancients, seems to adopt, in which there is no mention of fever, with some parts of his practice, it would appear probable, that even he is not wholly free from the above charge. It is an observation of Van Swieten and others well acquainted with enteritis, that when opiates are given at an early period, it frequently terminates in gangrene.

It may be asked, why opium is so hurtful in gastritis and enteritis, while we find it in many external inflammations, when applied to the inflamed part,* among the most powerful remedies. This seems to arise, as may be inferred from what was said above, not from the local action of the opium on the stomach and intestines. but from its being received into the mass of blood, and, by stimulating the vessels, increasing the vis a tergo. Thus it is from the opposite effect, that of allaying the action of the vessels, that saline medicines and certain narcotics prove useful in all inflammations.

Most of the observations respecting local as well as general remedies, made when we were speaking of gastritis, are applicable to the case before us. Among the former, blood-letting and blistering are still the principal. It sometimes happens when the inflammation is seated in the rectum, that the piles inflame and swell. Leeches applied in the neighbourhood, or to the piles themselves, are then the best remedy. In enteritis the blisters should always be applied to some part of the abdomen, and they should be of considerable size. Some practitioners recommend applying them at the same time to the limbs, which is attended with little or no advantage. The pain is often relieved as soon as the burning of the skin is perceived ; and what deserves particular notice, the same cathartics and clysters, as in the case of blood-letting, procure stools, which before the application of the blisters had failed.

Rubefacients are often serviceable. Flannel dipt in brandy and sprinkled with pepper applied over the abdomen generally affords some relief.

Fomentations are more frequently employed in enteritis, than in any other phlegmasia. A variety of disagreeable applications has been recommended for the purpose of fomenting the abdomen. Boerhaave and others recommend young animals cut up and applied warm, the skin of sheep newly killed, &c. But there is no reason to believe such applications are superior to cloths dipt in warm water, and wrung so that little more than the vapour is applied to the body. These are not only more cleanly

* See the observations made above, on the external use of opium in ophthalmia.

and can be applied of any temperature, but lighter also and more easily managed. Eller, who is a great advocate for the use of fomentations in this complaint, particularly insists on their being such as shall not by their pressure increase the patient's uneasiness.

The warm bath, especially the semicupium, is also recommended. Both this and the fomentations, however, often increase the weakness and anxiety ; when this does not happen, they may prove serviceable, but should not supersede the employment of blisters, which are a much more efficacious remedy.

The diet is the same as in other visceral inflammations.

To prevent a relapse, the diet should be mild and the body kept gently open for some time after every symptom of the complaint is gone.

With regard to the treatment after suppuration has commenced in enteritis, there is little to be done. When the abscess bursts into the cavity of the intestines, agrimony, virga aurea, and other medicines, have been recommended as means of healing the ulcer, but little or nothing is to be expected from them. If the patient is much reduced by the discharge, an infusion of the bark and some chalybeate waters have been found useful.

When the abscess bursts into the cavity of the abdomen, it appears, from what has already been said, that the case is as hopeless, (though death is generally longer delayed) as where the inflammation terminates in gangrene.

CHAP. XV.

Of Acute Hepatitis.

ACUTE hepatitis is defined by Dr. Cullen,

Fever, tension and pain, either pungent or obtuse, of the right hypochondrium, pain at the clavicle and top of the right shoulder, the patient lying with difficulty on the left side ; dyspnœa ; a dry cough ; vomiting, and hiccup.

All of these symptoms are rarely met with in the same case. When the dyspnœa and cough are considerable, for instance, there is generally no vomiting ; and when there is frequent vomiting, the patient is seldom troubled with a great degree of dyspnœa, and still more rarely with much cough. It is necessary, however, to mention in the definition of hepatitis, symptoms which only occasionally attend, because the constant symptoms of this complaint are not sufficient to distinguish it. On this account

both Sauvages and Sagar rank among the diagnostic symptoms of hepatitis those of jaundice, but their presence is not sufficiently frequent to assist much in the diagnosis.

SECT. I.

Of the Symptoms of Acute Hepatitis.

LIKE other inflammations, hepatitis makes its attack more or less suddenly, the patient sometimes complaining of a tightness about the precordia, accompanied with a degree of anxiety and fever, for some time before the symptoms peculiar to the complaint shew themselves ; at other times the pain in the region of the liver being among the first symptoms. In either case the accession is frequently attended with some degree of cold shivering.

The chief diagnostic symptoms of this complaint are, the seat and kind of the pains which attend it. The acute hepatitis is almost always attended with a pain in the right hypochondrium, which is sometimes shooting, accompanied with a sense of tension in the part ; in some cases it is constant and severe, in others deep seated and obtuse.

The pain, however, is not confined to the region of the liver ; it extends to the breast, clavicle, and shoulder of the right side, and in the last it is often more acute than in the seat of the disease. The pain of the hypochondrium is increased on pressure, especially when the position of the body is such as to relax the abdominal muscles.

Practitioners have been at some pains to determine what part of the liver is affected in different cases of hepatitis. When the pain extends to the clavicle and chest, the convex part is most frequently affected ; when it is much increased on pressure, the anterior part of the liver is the chief seat of the disease. When the pain extends chiefly to the region of the stomach, and is not much increased on pressure of the right hypochondrium, there is then reason to believe that the inflammation chiefly occupies the concave part, in which case the pain sometimes extends to the abdominal muscles, and the complaint has been mistaken for an inflammation of them.

In this, as in other visceral inflammations, the kind of the pain has been supposed to point out whether the membrane or the parenchyma is the seat of the disease ; in the former case the pain being acute, in the latter obtuse. This observation, however, as I have more than once had occasion to remark, is not to be depended upon.

Dr. Girdlestone observes, that when pain of the shoulder attends hepatitis, its seat generally corresponds with the part of the

liver most affected, being anterior or posterior according as the anterior or posterior parts of the liver are the seat of the complaint. When the inflammation attacks the left lobe, the pain is often in the left shoulder. Dr. Chisholm* says, that it is sometimes in both scapulæ, and now and then felt in the left side under the lower false ribs.

It is generally most severe when the patient lies on the left side ; sometimes, though rarely, when on the right side ; in many cases he finds himself easiest on the back, with the head low.

The pain of the side, as well as the shoulder is often increased during inspiration, which is impeded by it. As might be supposed, it is most so when the parts lying nearest the diaphragm are inflamed ; it is in these cases too that the cough which accompanies this complaint is most severe, and that hiccup most frequently supervenes.

The cough is generally short, dry, and frequent, and the hiccup, which is never a favourable symptom, is sometimes so violent that it almost interrupts respiration.

When hepatitis is attended with cough and difficulty of breathing, the reader will perceive how readily it may be mistaken for pneumonia, and he will find from the dissections of Morgagni and others, that this has frequently happened. When the convex surface of the liver is much inflamed, the inflammation sometimes actually spreads to the diaphragm and even to the lungs.

In inflammation of this part of the liver, the external swelling is often considerable, but the inflammation is seldom communicated to the skin.

When the concave part is affected the stomach partakes of the disorder as much as the lungs do in the former case, the nausea and vomiting being more urgent than in other forms of hepatitis, and here the cough and dyspnœa are either wanting or present in a much less degree. In most instances the secretion of bile is increased, and it sometimes happens, that its flow into the intestines is prevented, generally, perhaps, by a constriction of the ducts. The skin, white of the eyes, and urine, are then tinged with yellow as in jaundice. These symptoms, as we should suppose a priori, most frequently attend when the inflammation is seated in the concave part of the liver.† Inflammation of this part of the liver also is generally attended with the same anxiety and debility, though generally in a less degree, which attend gastritis, from which it is often difficult to distinguish it. The truth is, that although there are many cases of pneumonia, gastritis,

* See a paper on Hepatitis, by Dr. Chisholm, in the 11th vol. of the Medical Commentaries.

† See the observations of Burserius, Quarin, and others.

and hepatitis, in which the characteristic symptoms of each being distinct, there can be no doubt respecting the seat of the inflammation ; yet, from the vicinity of the lungs, liver, and stomach, the sympathy of these parts, the difficulty with which the precise seat of internal pains is ascertained, and above all, the tendency of inflammation to spread to neighbouring parts, these complaints are sometimes confounded by the most discerning.

The pulse, when the concave part of the liver is affected, is often small and feeble ; in other cases it is strong ; in all hard. The urine, whether tinged with bile or not, is generally high coloured, the heat and thirst considerable, the mouth dry, and the tongue covered with a white yellowish crust, which in the progress of the disease, often assumes a dark or even black colour. The strength is reduced by constant watching ; and delirium sometimes, though not frequently, supervenes.

In some cases the bowels are costive, in others a diarrhœa comes on, with griping and bilious stools. It now and then happens, that the purging is dysenteric ; the case, however, is then to be regarded as complicated ; for the dysentery may be looked upon as a distinct complaint, generally occasioned by the irritation of an unusual quantity of bile in the intestines, and that often vitiated.*

It is to be remarked, however, that the bilious and slightly bloody stools, which frequently attend hepatitis, have by careless observers been mistaken for dysentery ; which has given rise to the opinion of these complaints being more frequently complicated than they really are.

The tendency of hepatitis to resolution, as of other similar complaints, is known by the general mildness of the symptoms and their yielding to the proper remedies, particularly by there being little dyspnoea, cough, hiccup, vomiting, oppression, or debility.

As in other febrile diseases, there are certain symptoms which frequently attend the favourable termination of hepatitis, amongst these are hemorrhagies, particularly those from the nose and hemorrhoids. Hepatitis is sometimes terminated by sweat, which, when symptoms of jaundice attend, often stains the linen of a yellow colour. An increased secretion of mucus from the lungs is also to be ranked among the crises of this complaint ; and instances are on record in which this secretion has been so copious towards the termination of hepatitis as to occasion suffocation. A copious flow of high coloured urine, depositing a red or whitish sediment is also a favourable symptom, particularly if it appears before the fourth day.

* See the observations of Van Swieten. *Com. in Aph. Boerh.*

When hepatitis is terminated by resolution, Lieutaud observes, it is generally in three or four days ; if it last to the seventh, there is little doubt of its terminating in suppuration.

When this complaint terminates by metastasis, the inflammation is frequently translated to the spleen or the skin, appearing on the latter in the form of erysipelas.

Resolution is the only termination of hepatitis which can be regarded as favourable, although suppuration is upon the whole less fatal here than in most other visceral inflammations. There are few of the viscera in which inflammation is more apt to run to suppuration, than the liver. Sir John Pringle observes, that next to the lungs, this is the viscus most apt to suppurate.

* We judge of the tendency to this termination by the violence and obstinacy of the symptoms. In most phlegmasiæ an unusual violence of the symptoms indicates a tendency to gangrene. Here, however, gangrene rarely occurs.

As soon as suppuration takes place, the pain remits, and there is generally a sense of weight and pulsation in the region of the liver, the former being increased by lying on the left side. These symptoms are attended with frequent and irregular shiverings, and at length with hectic fever.

In many cases there is an evident tumor, and fluctuation may be readily felt. Lieutaud and Burserius caution us against mistaking the distended gall bladder for abscess of the liver ; from the situation of the gall bladder, however, this mistake cannot readily be made.

The danger from suppuration in hepatitis depends much on the seat of the abscess. When it evidently points outwards, there is almost always an adhesion of the liver to the parietes of the abdomen, the matter is readily discharged by an incision, and the patient frequently recovers. Dr. Clark of Dominico* says, that of those in whom the matter was discharged in this way, two in three were saved. Few practitioners seem to have met with equal success.† When the abscess is seated in the more internal parts of the liver, there is no external swelling, and the fluctuation can rarely be perceived. In such cases adhesions are often formed with the intestines, and the abscess bursting into them is discharged by stool, and the patient sometimes recovers. Dr. Cullen, Dr. Saunders, and others, think it probable, that the matter sometimes passes along the biliary ducts into the intestines. An adhesion is sometimes formed with the diaphragm, and the abscess bursts into the cavity of the thorax. There is, perhaps,

* Medical Commentaries, vol. xiv.

† The wound formed by opening the abscess seldom heals readily, but the health frequently improves rapidly after the operation.

no instance of a recovery after this accident. The patient is gradually wasted by hectic fever. In other instances the lungs are involved in the adhesion. The diaphragm adheres to the liver, and the lungs to the diaphragm. The abscess then often bursts into the substance of the lungs, and either occasions suffocation, or, when the quantity of matter is small, purulent expectoration and hectic fever. Purulent expectoration may occur in hepatitis without any direct communication between the liver and lungs, in consequence of the inflammation spreading to the latter, and either occasioning abscess there, or a purulent secretion from the surface of the bronchiæ.* Sometimes, though more rarely, suppuration takes place in the liver without any adhesions being formed, and the matter is discharged into the cavity of the abdomen occasioning the purulent ascites.

The period of suppuration in hepatitis is various, according to the violence of the symptoms, temperament, and habit of the patient, mode of treatment, &c.

Hepatitis, though very rarely, terminates in gangrene. The tendency to gangrene is known by an unusual violence of the symptoms, rapidly increasing, and not yielding in any measure to the proper remedies. When gangrene has actually supervened, the inflammatory symptoms subside suddenly, cold sweats supervening, and the pulse becoming weak and fluttering, with constant hiccup and cold extremities. There is generally a black matter rejected by vomiting, the stools being unusually offensive and of a dark colour; and fits of syncope frequently precede death, which is never long delayed. This case is as hopeless as the cases of gangrene we have just been considering.

Dr. Cullen does not enumerate schirrus of the liver among the terminations of hepatitis. It has, however, generally been ranked among them. But from the observations of Dr. Saunders and others, it would appear, that schirrus is rather regarded by them as a consequence of cronic than acute hepatitis, and the symptoms of the former are often so equivocal, that its presence is not always ascertained with much accuracy. I have not been able to trace any one of very many cases of schirrus liver which I have met with, to acute hepatitis. And I do not find that those who have maintained that it proceeds from the chronic hepatitis, have adduced facts sufficient to establish their opinion, for it is to be recollected, that more or less languid inflammation generally accompanies and seems to be occasioned by a schirrous state of the viscera.

* See a Paper, by Aaskow, in the Act. Soc. Med. Haf. vol. ij.

SECT. II.

Of the Causes of Acute Hepatitis.

HEPATITIS is more frequent in the warm than in cold or temperate climates.

It is most apt to attack those of a choleric and melancholic temperament. Adults are more subject to it than those under puberty. Dr. Girdlestone remarks, that while the other soldiers were seized with this complaint, the drummers and others who were under age, although equally exposed to fatigue, the heat of the climate, &c. seldom suffered from hepatitis.

The small lobe of the liver is most subject to inflammation, and the outer and convex surfaces more than the concave. In Britain the liver is upon the whole less subject to acute inflammation than most of the other viscera.

The occasional causes of hepatitis are very numerous. Many of those mentioned by authors have been assigned. Dr. Cullen thinks, on a very uncertain foundation. He, however, seems rather inclined too much to abridge the number of the occasional causes of this disease. It must be granted, indeed, that many of those assigned by authors, particularly certain supposed states of the bile and of the circulation in the vena portarum, seem quite hypothetical.

Among the most frequent causes of hepatitis may be ranked contusions, especially such as occasion a fracture of the cranium. After accidents, in which the cranium is much injured, there is often an unusual secretion of bile, and other symptoms denoting derangement in the function of the liver. Blows or contusions on other parts of the body, however, often excite this disease. Violent passions of the mind, particularly rage and the depressing passions, are to be ranked among the causes of hepatitis. Melancholy, which has been found to diminish the secretion of bile, seems particularly apt to excite hepatitis; and the state of the mind is certainly so far connected with that of the liver that the latter is seldom deranged without occasioning a greater or less degree of this passion. The constant application of a great degree of heat in any form, is a frequent cause of hepatitis, but what we should not, a priori, expect, the rays of a vertical sun on the head is one of the modes of applying heat most apt to excite it.*

Among the causes of hepatitis, violent exercise holds a principal place. It is common in warm climates for soldiers in long and fatiguing marches to be seized with this complaint.

A variety of fevers has been ranked among the causes of

* See the observations of Dr. Girdlestone.

hepatitis, particularly intermitting and remitting fevers, probably from these being the most frequent in the climates most liable to complaints of the liver. Hippocrates, Boerhaave, Van Swieten, and others, however, bear testimony of its being frequently excited by fevers of various kinds. And the first of these writers justly regards its appearance in low fever as a very unfavorable accident. There is often an unusual enlargement of the liver, heart, and spleen. in those who die of the plague.* The same observation has been made respecting the scurvy. How far these appearances arise from inflammation has not been ascertained.

As in the other phlegmasiæ, cold is a frequent exciting cause, especially when applied suddenly, whether to the surface or to the stomach, while the body is over heated. The damps of the night in warm climates frequently excite this disease.

Among the causes of hepatitis may be mentioned the concretions so frequently formed in the gall bladder and ducts. A schirrus of any part of the liver, or neighbouring part pressing on the liver, may excite this complaint. Does hepatitis ever arise from a vitiated state of the bile? There is reason to believe that any cause obstructing the course of the bile into the intestines, whether it be a biliary calculus sticking in the ducts, a spasmodic contraction of them, an inflammation communicated to them from the intestines or other neighbouring parts, tumors of the liver, or other parts pressing on them, worms lodged in them, &c. may occasion hepatitis. In various animals, oxen, calves, sheep, small worms have been found in the biliary ducts.† And it would appear, from some dissections, that this has sometimes happened in the human body.‡ But the opinion of Van Swieten, that worms may sometimes find their way to the liver through the mesenteric artery, seems quite hypothetical. The same may be observed of the opinions which have prevailed respecting the manner in which the foregoing causes affect the circulation in the liver, concerning which much has been said. If it be admitted that inflammation depends on a debility of the extreme vessels, the *modus operandi* of these causes will be evident.

Dr. Cullen ranks among the occasional causes of the acute hepatitis, the chronic form of this disease; for the two forms frequently pass into each other.

Hypochondriasis, cholera, and other diseases of the alimentary canal, are ranked among the causes of hepatitis.

Like other inflammatory diseases, it often arises from the sup-

* See le *Traite de la Peste*.

† Van Swieten's *Comment. in Aph. Boerhaavii*.

‡ See a dissection, by Nebelius, in *Nova Acta Physico Medica*, vol. v.

pression of some habitual discharge, particularly from that of the hæmorrhoids.

There is no other of the phlegmasiæ, perhaps, so frequently excited by the use of spirituous liquors, as hepatitis. Its frequency in India is ascribed, by Bontius and others, to the general use of arrack.

Dr. Girdlestone mentions bad water among the causes of hepatitis; and Dr. Cleghorn remarks, that in a certain part of Minorca, where the water is bad, tumified spleens and livers are frequent both in men and brutes. Various other circumstances in diet are ranked among the causes of this disease in warm climates. The want of vegetables, great repletion after fasting, bad diet in general, particularly the want of a proper quantity of fluid. Violent and long continued thirst is mentioned by a variety of writers, particularly those of warm climates, as a frequent cause of hepatitis. Boerhaave remarks, that it is most apt to supervene in fevers when the patient has fasted for some time and endured much thirst.

Is the frequency of this complaint in both the Indies to be at all attributed to the great quantity of peppers used in those countries?

Dr. Girdlestone and others mention the abuse of mercury among the causes of hepatitis.

In a paper, above referred to, Dr. Chisholm maintains that it is contagious. This, however, is not confirmed by the observations of others.

SECT. III.

Of the Treatment of Acute Hepatitis.

THE treatment of hepatitis so nearly resembles that of the phlegmasiæ we have been considering, that it will not be necessary to speak of it at length.

When the inflammatory symptoms are considerable, blood-letting is necessary, and, on account of the great tendency of hepatitis to suppuration, it should be employed early. Licutaud observes, that we should seldom let blood in this complaint after the fourth day, unless some particular symptoms demanding blood-letting, make their appearance.

We shall, however, be better guided by the state of the symptoms, than by any rule of this kind. When the pulse is hard and the pain urgent, blood-letting is proper at any period. It is the opinion of Quarin and others, that less blood-letting is necessary in hepatitis, on account of the peculiarity of the circulation

in the liver. It is true that blood-letting ought not to be carried to the same extent in this complaint, as in gastritis and some other phlegmasiæ. not, it would appear, for the reason here assigned, but because in hepatitis the inflammatory symptoms seldom run so high, and the organ affected is less essential to life.

Cathartics are employed with great advantage in hepatitis. The saline cathartics, with much dilution, are particularly recommended by Lieutaud and others. Dr. Girdlestone remarks, that by small doses of the neutral salts, given at intervals, so as to keep up a constant catharsis, the acute hepatitis is sometimes changed into the chronic, a form of the disease less dangerous, provided we are aware of its presence. Mercurial cathartics seem better adapted to hepatitis than any other, but of the use of mercury in this complaint I shall presently have occasion to speak more particularly.

The exhibition of cathartics should not supersede the use of copious mild glisters, which are particularly serviceable, both as a fomentation, and a means of removing irritation, and supporting the discharge from the intestines.

The diet in hepatitis should be the same as in the other phlegmasiæ.

The local remedies, and the mode of employing them, are the same as in other visceral inflammations. Unless the symptoms are unusually violent, the application of a blister should not be longer delayed than after the first blood-letting. It should be applied as near the place affected as possible. And the constant repetition of blisters during the complaint, is preferable to supporting the discharge from the same blister, as many have recommended.

Local blood-letting will still be found to supply the place of general evacuations, particularly after the violence of the disease is broken, and consequently to diminish the extent to which it is necessary to carry them.

Fomentations are more generally employed in hepatitis than in most of the phlegmasiæ, and are often attended with considerable advantage. A large quantity of any mild warm fluid received into the stomach, is often found more effectual than external fomentation.

The appearance of any of the crises demands attention; when a bilious diarrhœa, which in this complaint, we have seen, is often mixed with blood, supervenes, we ought neither to check nor increase it by cathartics, but merely encourage it by mild mucilaginous decoctions. When the urine appears turbid, many recommend diuretics, a practice which seems to rest chiefly on hypothesis, and from which little is to be expected. If an crysi-

pélatous inflammation appears on any external part, bringing relief, we must be cautious of using any means which tend to remove it. Spontaneous bleeding from the nose or any other part of the body, is to be encouraged by fomentations. And if the blood flows very slowly, it is sometimes found useful to apply leeches as near as we can to the seat of the hemorrhagy. This has been particularly recommended where a tendency to hemorrhoids shews itself. When an expectoration attends the cough and seems to bring relief, it is often serviceable to promote it by the antimonium tartarizatum, which, with other nauseating medicines, we have seen, are useful in all the phlegmasiæ. When a moisture appears on the skin, mild, mucilaginous, and diaphoretic decoctions should be freely employed.

After the inflammatory symptoms have subsided, the strength of the patient is to be restored by an invigorating diet and wine; and as soon as they can be employed without the danger of a relapse, by tonic medicines, for there are few complaints which leave behind them more languor and debility than hepatitis.

It is also very readily renewed, so that it is necessary for some time after the disease is removed, to pay particular attention to diet, and to avoid the various exciting causes of the complaint above enumerated.

It is now common, particularly in the East-Indies, to use mercury in all affections of the liver. I shall have occasion to speak of its use more at length in treating of the chronic form of this complaint, in which it has been more generally employed. It may be observed here, that we have reason to believe, notwithstanding the observations of Dr. Saunders and others, that, especially employed as a cathartic, mercury is a valuable medicine in the acute hepatitis. Dr. Girdestone, Dr. Chisholm, and others, who have practised in warm climates, speak of it as the remedy on which, next to blood-letting, they chiefly relied. Nor did they trust to its cathartic powers, but endeavoured to excite salivation even in the most acute forms of the disease.

The employment of mercury in the acute hepatitis, however, has not been confined to the Indies. Dr. Clark of Newcastle says, he has used it with great success when mere cathartics had been employed in vain.

I have already had occasion to hint that the acute hepatitis sometimes terminates in the chronic. When this happens, a careless observer may believe the patient restored to health. After the inflammatory symptoms have disappeared, therefore, it is necessary to examine him with care. We must feel whether there be any hardness or swelling remaining in the region of the liver. If the patient is restored to health, there will be no pain in this region, on pressure, while the patient is in different postures, nor pain nor itching in the right shoulder, no anxiety after eating a

full meal or using exercise ; and if jaundice has appeared in the course of the disease, the skin, eyes, fæces. and urine, will assume their natural colour. But we are about to consider the symptoms of chronic hepatitis at greater length.

CHAP. XVI.

Of the Chronic Hepatitis

ALTHOUGH chronic hepatitis, being frequently unattended by fever, does not come under the description of the diseases considered in this treatise, yet such is its connection with the acute form of the complaint, that it is impossible to be thoroughly acquainted with the treatment of either without understanding that of both.

Dr. Cullen makes the following apology for passing over in silence the chronic form of the disease. "The chronic hepatitis," he observes, "very often does not exhibit any of these symptoms," viz the symptoms of the acute, "and is only discovered to have happened by our finding in the liver, upon dissection, large abscesses, which are presumed to be the effect of some degree of previous inflammation. As this chronic inflammation is seldom to be certainly known, and therefore does not lead to any determined practice, we omit treating of it here, and shall only treat of what relates to the acute species of hepatitis."

But although we cannot at all times determine the presence of this complaint, yet in by far the majority of cases this may be done. Besides, the chronic hepatitis sometimes assumes the form of other complaints, which would lead those unacquainted with it into errors of serious consequence.

Although Dr. Cullen declines treating of the chronic hepatitis in his First Lines, in his System of Nosology he enumerates the symptoms from which we may suspect its presence. We may suspect the presence of the chronic hepatitis, he observes, from the causes of this complaint having been applied, from a sense of fulness and weight in the right hypochondrium, from pains more or less pungent in the part, from some pain being felt in it on pressure, or on lying on the left side, and lastly from a degree of fever attending these symptoms.

SECT. I.

Of the Symptoms of Chronic Hepatitis.

IN the definition just quoted Dr. Cullen enumerates the principal symptoms of the most common form of chronic hepatitis:

But this complaint assumes such various appearances, that were it not for the treatment and appearances on dissection being similar in all, they would be regarded as complaints as distinct as any with which we are acquainted.

The chronic hepatitis very often begins with symptoms of indigestion. The appetite is irregular, and after eating, the patient is troubled with acidity, flatulence, and a sense of fulness in the stomach, the countenance becomes pale and yellowish, swollen, sometimes bloated, and the eyes dull and languid.

There is a sense of uneasiness about the hypochondria, sometimes attended with shooting pain, which frequently extends to the clavicle and right shoulder; the pain of the hypochondria and sometimes of the clavicle and shoulder, being increased by pressure on the region of the liver.

The pain is sometimes confined to the right shoulder, and sometimes felt chiefly when the shoulder is pressed, sometimes it is rather an itching than pain.

During the course of the disease the patient often complains of pains of various kinds, either dull or acute, frequently attended with a sense of weight or fulness in the epigastric and hypochondriac regions, and with some degree of hardness and tumor of these parts, particularly of the right hypochondrium. In some there is a dull pain in the lumbar region.

As in other cases of indigestion, there is much languor and lassitude, with an inclination to sleep. The sleep, however, is seldom refreshing and often interrupted by dreams. The patient becomes melancholy and fond of retirement. The state of the bowels is very variable, being sometimes costive, sometimes affected with diarrhœa. The stools are at one time of an ash colour, at another yellow or almost black, and very fetid. They are sometimes frequent, small, and mucous, the abdomen at the same time being tense and hard.

The pulse in many cases undergoes little change, being only more feeble and languid than natural. In some cases it is slower, in others stronger and more frequent.* When there is much soreness, on pressure, in the region of the liver, the pulse is more or less hard, particularly in the evening.

The tongue is generally foul, for the most part white and dry, and the gums often become harder than natural. The skin is parched, hard, and constricted, especially, Dr. Girdlestone remarks, on the muscular parts of the body; the urine scanty and high coloured.

The breathing is generally much affected. A degree of dyspnoea, accompanied with a dry teasing cough, sometimes comes

* Dr. McLean's Thesis, published at Edinburgh in 1790.

on at an early period, almost always in the progress of the complaint, the shoulders appearing daily more elevated. It sometimes happens that the dyspnœa is unattended by a cough and more frequently that the cough is moist, the patient expectorating with difficulty, but experiencing considerable temporary relief to the breathing from bringing up a little phlegm or mucus, of which the matter expectorated in this complaint generally consists. Towards the termination it frequently assumes more or less of a purulent appearance. The pain of the hypochondrium is generally increased during the exertion of coughing.

Lying on either side, particularly on the left, frequently occasions uneasiness, and the patient feels his complaint least when he lies on his back, turning a little to the right, with his shoulders gently raised.

Acute pain, hiccup, and vomiting, are more rare in the chronic, than in the acute hepatitis. In the former, as well as in the latter, some degree of jaundice frequently appears. These symptoms, with more or less rapidity, gradually increase. Fever shews itself, particularly in the evening, which is soon accompanied with night sweats, emaciation, great debility, and fetid and putrid stools. In short, complete hectic comes on in consequence of the formation of one or more abscesses, which bursting where the least resistance is opposed, generally prove fatal.

It sometimes happens, (as in the acute hepatitis) indeed, that adhesions are formed between the liver and parietes of the abdomen, the matter pointing outwardly is discharged by the skin, and the patient often recovers. The abscess may also burst in any of the other ways mentioned when we were speaking of the acute hepatitis.

In the chronic hepatitis it sometimes happens, that the abscess is not formed in the liver, but in the lungs, several cases of which I have seen. It is observed above, that the inflammation of the liver is sometimes communicated to the lungs, this happens most frequently in the chronic hepatitis, in which the liver, often remaining for a long time in an enlarged and perhaps indurated state, by the irritation it occasions, excites inflammation and suppuration in that part of the lungs on which it presses, the consequence of which is a confirmed phthisis.

Can chronic hepatitis and schirrus of the liver in all cases be accurately distinguished? Whether schirrus be the consequence of chronic hepatitis, or an incipient schirrus occasion this complaint certain it is, that after the foregoing symptoms have continued for some time, an induration of part of the liver may frequently be felt, especially if the patient be laid on the back, with the knees a little raised so as to relax the abdominal muscles.

“ The patient frequently continues labouring under the symp-

“toms of chronic hepatitis until the dejection of spirits, which
 “always more or less attends this disease, prompts him to the
 “immoderate use of wine which scarcely ever fails to accelerate
 “the approach of the acute or inflammatory stage.”* For as the
 acute hepatitis often terminates in the chronic, when the patient
 is about to recover, the chronic often terminates fatally, by indu-
 cing the acute form of the disease.

It is almost unnecessary to observe, that all the symptoms
 which have been enumerated are never present in the same case;
 and such is the insensibility of the liver, that dissection has dis-
 covered abscesses in it where none of them had appeared.

In some cases the symptoms of hepatitis are of a very differ-
 ent nature. There is a fever, known in the East Indies under the
 name of the hill fever, from its being frequent in the hilly part
 of the Carnatic, which assumes the form of a very irregular in-
 termittent, resisting all the usual means. The appearances on
 dissection are the same as in the chronic hepatitis, and it yields
 readily to the mode of treatment found successful in this com-
 plaint. “In all the cases I have seen of this kind,” says Dr.
 Girdlestone, “the livers were diseased. especially the left lobes ;
 “and the patients were restored to health only by treating their
 “complaints as diseased livers.”

Another, and very different, form of the complaint is also noti-
 ced by Dr. Girdlestone, and less distinctly by some other writers.
 It appears like a chronic dysentery, the nature of which soon be-
 trays itself, by the appearance of a tumor in the region of the
 right lobe of the liver, which is found to contain a quantity of pu-
 rulent matter ; and the only means of preventing this termination
 is treating the complaint as a case of chronic hepatitis. Dr. Ly-
 sons, of Bath, in his Practical Essays, observes of the chronic
 hepatitis, “From the appearance of the excrements and pain
 “in the bowels this disorder was deemed a dysentery, and as
 “such treated to no purpose.” Both of these varieties of the
 complaint are mentioned by Dr. M’Lean, and the latter by Dr.
 Saunders.

If the reader considers the symptoms above detailed, he will
 not be surprised at the following remarks. “From repeated ob-
 “servation,” Dr. Saunders observes, “I am inclined to believe,
 “that the chronic inflammation of the liver is frequently mista-
 “ken for a dyspeptic state of the stomach ; and I have seen many
 “cases of this kind, which have been supposed to arise from indi-
 “gestion. The patient generally complains of pain, which he
 “falsely attributes to the stomach, and its continuance is so short,
 “and the degree of it frequently so inconsiderable, that no alarm
 “respecting the future health of the patient is produced. The
 “relief obtained by eructation and discharge of air tends to con-

* Dr. Girdlestone.

“firm the opinion that the disease is in the stomach ; but this relief may be explained on the principle of removing the distention of the stomach, and so taking off the pressure of this organ from that which we believe to be the seat of the disease.”

No person acquainted with chronic hepatitis can be long engaged in practice without seeing these observations amply confirmed. In a large proportion of those dyspeptics, who, along with symptoms of indigestion, are troubled with a cough and some affection of the breathing, it will be found, that there is a tenderness in the region of the liver, especially if the state of the bowels is very variable. When this tenderness cannot be detected, by pressing below the ribs, it is often evident, if the ribs which cover the liver be suddenly struck while the position of the patient is such that the liver is pressed against them. When this tenderness is detected, there can be little doubt respecting the cause of the symptoms just mentioned.

The chronic hepatitis sometimes runs its course in a short time. In other cases, it is protracted for months, or even for years.

The chronic hepatitis is a less dangerous complaint than the acute, if it be not overlooked till a tendency to suppuration takes place. The prognosis is then the same, and collected in the same way, as in the acute form of the disease.

SECT. II.

Of the Appearances on Dissection.

INSTEAD of shewing traces of inflammation, as in the acute, in those who die of chronic hepatitis, the liver appears of an ash or clay colour. It generally undergoes some change of shape; the lower edge, Dr. Saunders observes, especially of the left lobe, which is naturally thin, becomes rounded and gibbous, and the whole substance of the liver acquires a firmer and more solid consistence, although, if weighed, it is often found lighter than the healthy liver.

But the appearances of the liver in those who die of chronic hepatitis, is very various. Dr. Lind in his account of the diseases incidental to Europeans in warm countries, observes, that the liver of those who died of the chronic hepatitis, was sometimes so eaten through as to resemble a honey-comb. Its size in some cases is much lessened, sometimes it is enlarged; this is frequently the consequence of one or more abscesses being formed in it. In some epidemics, however, as in that described by Dr. Chisholm, in a paper above alluded to, the liver was found uniformly much enlarged without any appearance of abscess.

In other instances it is almost wholly consumed by the abscess. Bontius, in his *Obs. Select. in Dissect. Cadav. Descriptæ*, relates a case in which there was found no appearance whatever of liver, but in its stead a membrane resembling a sack, containing a little sanious matter like water in which flesh had been washed. The patient had, for some time before his death, expectorated a matter of the same appearance. Mangetus, in his *Biliotheca Medica*, relates a similar instance, only differing in this, that the sanious matter, instead of being expectorated, was passed by stool.

In different cases different parts of the liver are diseased. The left lobe frequently suffers. In many cases there is but one abscess or ulcer; in others, a great number of ulcers or small abscesses are found in different parts of the liver.

The matter found in these abscesses varies, from a tolerably well formed pus to a thin sanious matter, such as was found in the two instances just mentioned. Sometimes it is extremely acrid, corroding the parts in its neighbourhood, even the bones themselves. "In some of those whose livers came to suppuration," Mr. Bogue observes, in some remarks on this complaint, inserted in Dr. Lind's *Essays*, "I have known instances where the matter has been so acrid as not only to corrode, but to dissolve, the cartilages at the extremities of the false ribs, and likewise part of those ribs." The matter discharged from abscesses of the liver is often very fetid, which is an unfavourable symptom; so that Bontius observes, that when abscesses of the liver are laid open, the prognosis may, in some measure, be gathered from the matter being fetid or otherwise.*

SECT. III.

Of the Causes of Chronic Hepatitis.

I NEED say little of the causes of this form of the disease, since the same causes produce both the acute and chronic. It would seem that the full sanguine constitution is most subject to the former, the exhausted and melancholic to the latter. The circumstances which predispose to each have not, however, been observed with much accuracy. The same circumstances are enu-

* The reader will find a very remarkable disease of the liver, described by Mr. Crawford, surgeon on board of the Earl of Middlesex East Indiaman, in a Treatise, entitled, *An Essay on the Nature, Cause, and Cure of a Disease incident to the Liver*. The same disease is mentioned as the chronic hepatitis by some foreign writers who had not an opportunity of seeing Mr. Crawford's treatise. Whether it should be regarded as such it is difficult to say. It resembles more the epidemic, described by Dr. Chisholm, than any other of which I have seen an account. For a particular account of the symptoms of this disease, the appearances on dissection, &c. the reader is referred to the above treatise.

merated by authors as predisposing causes of both. It would appear, that there is something in climate which predisposes to the acute or chronic hepatitis, since we find the former chiefly treated of by authors who practised in Europe, Pringle, Boerhaave, Van Swieten, Lieutaud, M'Bride, Eller, Quarin, Sims, Burserius, Bianchus, Cullen, &c. and the latter by those who practised within the Tropics, Lind, Clark, Bontius, Rollo, Reid, &c. Others, indeed, Lysons, Millar, Girdlestone, Saunders, &c. describe both forms of the disease, but, for the most part, they either mention the one only as the consequence of the other, or they speak of one of them less from their own observation than that of others.

The chronic hepatitis, however, is a more frequent complaint in Europe than most practitioners are aware of, for its symptoms being obscure, it is frequently overlooked. It has even been epidemic in this part of the world. The reader will find an epidemic of this kind described by Fisher, in the Fifth volume of Haller's *Disp. ad Morb. Hist. et Cur. Pert.* He may also consult two papers in the second volume of the *Acta Soc. Med. Hafnien-sis*. Upon the whole, however, the chronic hepatitis in Europe is seldom of that kind which runs to suppuration, but partakes more of the nature of schirrus.

SECT. IV.

Of the Treatment of Chronic Hepatitis.

THE treatment of chronic hepatitis is very simple. The acute and chronic forms of the disease imperceptibly run into each other, so that there are cases which deserve the name of chronic, in which, notwithstanding, the inflammatory symptoms are very evident, so that we occasionally have recourse to powerful anti-inflammatory measures in this as well as in the acute hepatitis. We are particularly cautioned against employing blood-letting where the inflammatory symptoms are moderate; the mild saline cathartics and blisters are sufficient.

I have already had occasion to hint, that it is admitted on all hands, that no remedy in chronic hepatitis is so powerful as mercury. It is alleged by many, that the success of mercury in chronic hepatitis has been greatly exaggerated. It would appear, however, that when employed at a proper period of the disease, that is before any signs of suppuration have taken place, it deserves all the commendation bestowed upon it. It is true, as Dr. Lind remarks, that the employment of mercury in this disease is empirical. We can give no account of the manner in which it acts, but no person acquainted with the state of medical knowledge will be less inclined to credit its good effects on this account.

For the most part, the exhibition of mercury should not be carried to a great extent in hepatitis. What is aimed at is gently to affect the gums, and this continued for a fortnight, three weeks, or a little longer, generally effects the cure. In some cases the disease proves more obstinate, and it is necessary to excite a considerable degree of salivation before the symptoms yield.

The languid inflammation of the liver, accompanied with schirrus or a disposition to it, so frequent in this country, yields also to the employment of mercury much more readily than to any other mode of treatment.

Mercury has been exhibited both internally and by friction in the chronic hepatitis. When in the former way, calomel is the preparation which has been generally employed. When it is exhibited by friction, the region of the liver is preferred for the application of the ointment. It is not improbable, that the friction itself, in the neighbourhood of the liver, may be serviceable, independently of the additional stimulus by sympathy from the vicinity of the parts.

Many give a decided preference to the external use of mercury in the hepatitis. "I observed," says Dr. Girdlestone, "that where the mercury was given by the mouth, the gums, after becoming sore remained hard and of a natural colour in many places; in other parts there were troublesome ulcerations, attended with copious spitting; whereas from mercurial friction alone, ulcerations never came on suddenly, but were always preceded by such a regular swelling and change of colour in the gums as to render their prevention extremely easy." It would appear besides, from the observations of this writer, that the external use of mercury more certainly relieves this affection of the liver; and Dr. Rollo also observes in his Treatise on the manner of preserving health in the West Indies, that the external use of mercury was more effectual in relieving hepatitis, than calomel taken internally. I think we may sometimes observe in other cases, that mercury exhibited by friction produces a more general and less painful affection of the gums than the internal use of it.

There are cases of chronic hepatitis in which the propriety of employing mercury is doubtful, particularly where it is combined with putrid fevers and other diseases of much debility.* The use of mercury in these cases has not been proved either to be hurtful or useless; from what has been observed in similar cases, practitioners have been afraid to make the trial.

The good effects of mercury in hepatitis generally appear as soon as the mouth begins to be affected, and sometimes soon-

* See Dr. Clark's Observations on the Diseases of the East Indies, page 272.

er.* When much difficulty of breathing or pain occurs during the mercurial course, as sometimes happens, even where symptoms had previously been very moderate, gentle cathartics and blisters may be recommended, or even blood-letting if it be judged necessary, without discontinuing the mercurial friction. When the foregoing symptoms are considerable, some advise the use of the mercury to be laid aside till they are removed. The fatigue of rubbing in such cases may be hurtful; but we have just seen, that mercury is employed with advantage even in the most acute hepatitis, especially when it acts as a cathartic; notwithstanding Dr. Girdlestone's assertion, that small doses of calomel, taken for a considerable time, have even produced the complaint. This may be true without affecting the observation just made, for every thing which greatly deranges the state of the *primæ viæ* may have this effect. In some constitutions the exhibition of calomel requires much caution.

It was chiefly by moderate blood-letting and the use of calomel that Mr. Crawford treated successfully the liver complaint which fell under his care; for an account of which I have referred to his treatise.

When the patient is too long in applying for assistance, or when the foregoing remedies fail and suppuration has taken place, some of the consequences above enumerated follow, if they are not prevented by laying open the abscess, which may readily be done if it points outwardly. The operation is a very simple, and with some practitioners has proved a successful one.

It is of material consequence to make the incision large enough and in a proper direction to evacuate the whole matter contained in the abscess. Sir John Pringle relates a case in which the patient seems to have lost his life from want of attention to these circumstances. Ruysch, who lived about the beginning of the last century, is among the first who have given cases in which this operation proved successful.

Bontius advises surgeons in the first place to cut through the muscles with caustic, lay open the peritoneum with the knife, and bring the liver in view, which is then to be pierced where the abscess is formed. To this mode of performing the operation there are many objections; besides, as the liver in such cases adheres to the parietes of the abdomen, there is no occasion for so complex an operation. Surgeons used sometimes to pass a trocar into the liver, leaving the canula, through which the matter was discharged. This is also objectionable, the opening made by the trocar being too small. The best method is to make a cut at

* Dr. Girdlestone observes, that an erysipelatous eruption often breaks out over the whole body after the mercury is employed for some time, which is soon removed by discontinuing it.

once through the muscles, peritoneum, and liver, of an extent proportioned to the size of the abscess, and in the most depending place, and having evacuated the matter, by an uniform pressure on the abdominal viscera, the wound should be kept open by dry lint, on removing which the matter may be pressed out as often as the surgeon judges necessary.

After the abscess ceases to discharge, the patient must for some time live cautiously, and particularly avoid eating voraciously, which those who are just recovered from this complaint are frequently inclined to do. They should avoid all kinds of distilled spirits, and use but a moderate quantity of wine. otherwise they are subject to a relapse. The moderate use of acids is regarded as a means of preventing this as well as some other diseases of warm climates.

CHAP. XVII.

Of Splenitis, Nephritis, Cystitis, and Histeritis.

I SHALL not enter into any particular consideration of the next four genera in Dr. Cullen's Nosology, the splenitis or inflammation of the spleen, nephritis or inflammation of the kidney, cystitis or inflammation of the urinary bladder, and histeritis or inflammation of the womb. A few words will be sufficient to make the reader acquainted with the symptoms which characterize these complaints, and as to the causes which produce them, and the treatment found to relieve them, they are so similar to those of the complaints which we have just been considering, that nothing need be said of them.

The first of these, splenitis, is defined by Dr. Cullen,

Fever with tension, heat, swelling, and pain increased on pressure of the left hypochondrium, without the symptoms of nephritis.

It was observed above, that this complaint has sometimes been mistaken for pleurisy. In the exquisitely formed splenitis, the pain is dull and the febrile symptoms are not very urgent. When these, with the symptoms just mentioned, are well marked, the complaint cannot be mistaken. The circumstance which renders the diagnosis at all difficult, is the obscurity of the office of the spleen, in consequence of which an inflammation of this organ is only attended with apparent derangement in the function of neighbouring parts.

There is a chronic splenitis analogous to the chronic hepatitis, collections of matter having been found in the spleen when no symptoms of inflammation had appeared.

Dr. Cullen defines nephritis,

Fever, pain in the region of the kidneys, often following the course of the ureter, frequent micturition, the urine being either thin and pale or very high coloured, vomiting, stupor of the leg, and retraction or pain of the testicle on the side affected.

Dr. Cullen makes two species of nephritis, the idiopathic and symptomatic, the former arising from the causes of inflammation in general, the latter generally from calculi lodged in the kidney or in the ureter, obstructing the flow of urine from that organ. The complaint with which the acute nephritis is most apt to be confounded, is the lumbago, especially when the muscles lodged within the pelvis partake of the affection. They may in general be readily distinguished by the change in the appearance of the urine in nephritis, by the nausea and vomiting, which do not, however, always attend this complaint, and the pain being much less increased by muscular exertion than in the lumbago; nor is the lumbago attended with stupor of the leg, and seldom with much, if any, affection of the testicle. Besides, the febrile symptoms in lumbago are either very moderate or wholly absent.

Clysters are particularly serviceable in nephritis. The application of blisters, Dr. Cullen observes, is hardly admissible, or at least requires great care, to avoid any considerable absorption of the cantharides. It is evident how much the symptoms of nephritis must be increased by strangury. Mucilaginous diluents are at all times necessary in the nephritis vera, and are rendered still more so if blisters are used.

This complaint frequently terminates in suppuration, and ulceration sometimes takes place in the kidney without materially affecting the health, which Dr. McBride, with great probability, attributes to the urine constantly washing out the matter.

The cystitis, or inflammation of the bladder, is defined by Dr. Cullen,

Fever, with tumor and pain of the hypogastrium, frequent and painful micturition, or ischuria tenesmus.

The idiopathic cystitis is a rare complaint. Inflammation of the bladder is most frequently the consequence of some other disease of the part, most frequently of calculi lodged in it.

Dr. Cullen defines histeritis,

Fever, heat, tension, and pain of the hypogastrium, the os uteri being painful to the touch, vomiting.

It is common for writers to treat of the inflammation of the pancreas and omentum as distinct complaints. When, however, the reader reflects on the situation of these parts, and how readi-

ly the organs in the neighbourhood of those affected with inflammation partake of it, or sympathise with the diseased part even where they do not partake of it, he will readily believe that inflammation of the pancreas and omentum is not to be distinguished from some of the foregoing phlegmasiæ.

CHAP. XVIII.

Of the Rheumatism.

RHEUMATISM, like hepatitis, is either acute or chronic. Of the latter I shall say but little, as it certainly does not belong to the class of febrile diseases. There was a similar objection to treating of the chronic hepatitis. But this being a disease of greater importance, and far less simple than the chronic rheumatism, and being occasionally attended with more or less fever, I thought it proper to speak of it at some length.

It is with little propriety that either the chronic hepatitis or chronic rheumatism are arranged under the definition of phlegmasiæ. Dr. Cuilen could not, however, have arranged them otherwise without having made a material alteration in his system. Besides, the immediate connection of these with the acute forms of the disease, seems to afford an apology for the place which they hold in his nosology.

The only method of forming an accurate system of nosology is to class diseases according to their symptoms, and where we find the symptoms so dissimilar, and the nature of the complaints so much allied, we are at a loss how to proceed.

Whatever is done in a system of practice, it would seem that in a system of nosology we ought to study the symptoms of diseases alone. If any other principle is admitted, the most dissimilar affections will frequently be classed together, according as the hypotheses of different writers lead them to conceive diseases allied to each other. There is no better reason for arranging the acute and chronic rheumatism or hepatitis under the same order of diseases, than for arranging together any other complaints which insensibly run into each other.

It would seem, that in forming a system of nosology our study should be to select the symptoms which characterize each disease in its perfect form, and arrange those together whose symptoms are most similar, without attending to the various gradations by which diseases run into each other. Is it our aim, in forming such a system, to assist the learner by enabling him to distinguish diseases? This is the simplest way; after he is acquainted with such a system a single perusal of a system of practice

will teach him the connection which diseases have with each other; this is not the purpose of nosology. Is it our aim in forming such a system, to assist the practitioner? This is the way in which we shall be most successful. I have frequently had occasion to observe, that where the symptoms are similar, the modes of treatment generally are so likewise. Even according to this plan, indeed, we shall often class together very different diseases, because in their most striking features they agree. Synocha and typhus are classed together, notwithstanding they are very dissimilar in their mode of treatment. But by classing diseases merely according to their symptoms, we shall, I believe, class together a greater number of diseases whose treatment is similar, than by pursuing any other method.

To see into what errors our best nosologist was led by losing sight of this principle, it is only necessary to peruse Dr. Cullen's order of spasmi. It looks like a common receptacle for the refuse of the whole nosology. This order is ready to receive every disease that is rejected by the others. Where is the similarity between hydrophobia and diabetes, between cholic and whooping cough, between dyspnoea and epilepsy, &c. ? It may be affirmed, I believe, that there is no person unacquainted with Dr. Cullen's peculiar opinions, who can point out for what reason these complaints have been classed together. If he was at a loss where to arrange any disease, it was only necessary for him to call it a spasm, and it found a place in one of the chief orders of his nosology.

No attention to symptoms of diseases, perhaps, will enable us to form a perfect system of nosology. The difficulties are far greater than at first sight they appear to be, but there is reason to believe, that, by steadily pursuing this plan, we may approach more nearly to such a system than has hitherto been done. If this plan is confessedly the best, ought we not to proceed on it as far as we can, and when we meet with difficulties which cannot be overcome, point them out, and leave them to be removed by future observation, rather than give our systems the appearance of being complete, at the expense of truth, or of proceeding on a principle which can be of little or no use either to the student or the practitioner. However ingenious, nay however just a theory may be, it should have no place in a system of nosology, which is a mere classification of terms, whose sole objects are to give accurate definitions of the names of diseases, and class together those definitions which most resemble each other.* To return from this digression.

The acute rheumatism is defined by Dr. Cullen,

A disease from an external and for the most part an evident cause, fever, pain about the joints, increased by external heat, shooting in the direction of the muscles, and occupying the

* See the General Introduction.

knees and other large joints rather than the joints of the hands and feet.

The first part of this definition is exceptionable. The causes of diseases should never be introduced into a nosological character, except where they are very evident, and the diagnostic symptoms are insufficient to distinguish the disease. Besides, what is here said of the cause of rheumatism is true of so many diseases, that it cannot characterize any one. Dr. Cullen seems to have introduced this part of the character to assist in forming a diagnosis between rheumatism and the pains of gout, syphilis, and scurvy. On the diagnosis of rheumatism I shall presently have occasion to make some observations. The branch of the sentence, indeed, considered in itself, is inaccurate, a disease from an external and for the most part an evident cause; if in some cases the cause of the disease is not evident, how do we ascertain that it is always external? The remaining part of the definition will be found sufficient to characterize the acute rheumatism.

SECT. I.

Of the Symptoms of Acute Rheumatism.

THE symptoms of acute rheumatism, like those of the other phlegmasiæ, may be divided into local and general. The seat of the pain in acute rheumatism is various, sometimes it is confined to one joint, more frequently it attacks several at the same time. For the most part it is not confined to the joints, but often shoots along the muscles from one joint to another, so that we talk of the rheumatism in the leg or thigh as well as in the hip or knee.

The rheumatism, as mentioned in the definition, generally attacks the larger joints; the shoulder, elbow, hip, and knee, and very frequently the wrists, are the chief seats of the pain. It affects the head and trunk as well as the limbs. The muscles of the neck, back, breast, and abdomen, are very subject to it. It has received various names according to the different places affected; when it attacks the muscles of the neck, it has been called torticollis; when those of the chest, bastard pleurisy, which I have just had occasion to notice; when the muscles of the loins, it has been termed lumbago; when those of the hip, ischias or sciatica. But when the rheumatism is confined to these parts, it is generally unaccompanied with fever, so that the foregoing terms express species of the chronic, not of the acute rheumatism. Vogel observes, that in young people the rheumatism most frequently attacks the head, breast, scapulæ, shoulders, and hands; in adults and old people, the back, hips, and thighs.

Rheumatic pains are much increased on the slightest motion requiring the action of the muscles affected, which is one of the

best diagnostics of the disease, so that when this disease affects many of the joints, and it is not uncommon for the acute rheumatism to seize on every joint of both the upper and lower extremities, the patient lies on the back with the limbs extended, enduring extreme pain, and unable to make the least motion.

When the disease remains fixed in particular joints, we look for a more obstinate disease than when it moves from one to another, which is the usual case, sometimes repeatedly attacking the same joint.

The pains are most severe and most apt to shift their place in the night time. Sometimes they regularly abate in the morning with a gentle sweat, suffering a considerable exacerbation towards evening, for during the day the patient often feels himself tolerably easy.

The disease, however, does not always take this course, and the pains are sometimes as severe in the day or even more so than in the night.*

After the pains have continued for some time, a degree of swelling appears in the parts most affected. This in many cases is moderate and confined to the joints, but Stork, in his *Anni Medici*, says, that he has seen the whole body tense and swelled. With the swelling there is generally some degree of redness, and the part is painful to the slightest touch. Sometimes even the weight of the bed-clothes is intolerable, so that it is necessary to support them over the patient's body.

The redness and swelling generally bring some relief to the pain. They seldom, however, entirely carry it off or prevent its returning to the part with as great violence as before. The pains are generally the last symptom which leaves the patient. They often begin to abate about the eighth or tenth day, but generally continue with more or less severity to the thirtieth or fortieth. Sometimes they continue for months or even for years. It is uncommon for patients to feel themselves free from pain before the twentieth day.

The foregoing symptoms are from their commencement attended with fever, the pulse being frequent, full, and hard. Sometimes the fever, sometimes the pain, is the first symptom, but the one never continues long without being accompanied by the other. The former generally begins with chills, succeeded by much heat and thirst. It is proportioned to the violence of the local symptoms. When the pain is not very severe, and is confined to one part of the body, the fever is slight. When it is severe, and felt in several parts, the fever is more considerable, and it is most so when the pains extend over the whole body.

* See Dr. Millar's Account of the Diseases of Great Britain.

The fever, like the pain, generally suffers an exacerbation in the evening, and a remission towards morning, especially when a degree of sweat comes on at this time.

The face, especially during the exacerbations, is red and somewhat swelled, the urine high coloured, sometimes depositing no sediment, at other times, particularly in the morning and when there is much sweating, one of a white or a reddish colour, and the passage of the urine frequently occasions some degree of burning pain in the urethra.

Nausea and vomiting rarely occur. The same may be said of delirium; the patient, however, is sometimes affected with a kind of stupor, although the pain and other symptoms generally prevent sleep during the first days.

I have already had occasion to observe, that the febrile symptoms abate sooner than the local; the former are rarely protracted beyond a fortnight or three weeks, and often cease sooner. While the fever abates, the pains generally become less violent and are less apt to change their place.

Rheumatism differs from the other phlegmasiæ in very rarely terminating in any other way than by resolution, so that the prognosis is chiefly collected from the state of the febrile symptoms. Some authors, indeed, mention cases in which abscesses were formed. It does not very clearly appear, however, whether or not in these cases the rheumatism was complicated with other diseases. Nor does it frequently happen that collections of effused fluid take place in the pained part. Stork, indeed, influenced probably by his hypothesis, observes, that if the rheumatic fever cease, and the swelling of the limbs subside suddenly, the matter formerly dispersed over the whole body is collected in one place and forms large lymphatic tumors, which generally occupy the knees, hips, groins, or shoulders. This must be rare; for Dr Cullen remarks, "if we may be allowed to suppose that such effusions are frequent it must also happen that the fluid is commonly re-absorbed, for it has seldom happened, and never indeed to my observation, that considerable or permanent tumors have been produced, or such as required to be opened, or have the contained fluid evacuated."

Rheumatism seldom terminates by a critical evacuation. It is common indeed for a sweat to break out and continue for a day or two, but it is often partial, seldom flows freely, and still more rarely brings any permanent relief. The reader, indeed, will find a sweat mentioned by Lieutaud and others as a favourable crisis of acute rheumatism, and upon the whole perhaps, although rare, it is more frequent than any other in this complaint.

The pains have sometimes remitted on the appearance of an eruption on the skin. Various hemorrhagies, the epistaxis, hæ-

morrhœis and others, and the menstrual discharge, have sometimes brought relief.

“A diarrhœa,” Dr. Millar observes, “is an unusual symptom in acute rheumatism ; when it happens the pain generally abates, and the fever sometimes degenerates into one of the putrid malignant kind.”

The acute rheumatism may be said almost always to terminate in the chronic, as the pains we have seen, generally remain for a considerable time after the fever.

The prognosis in the complaint is generally good. It is collected nearly in the same way as in the common synocha. Danger is only to be apprehended when the excitement is very violent, and does not yield readily to the proper remedies.

As the disease is usually protracted for a considerable length of time, and anti-inflammatory measures make the chief part of the treatment, it of en leaves the strength much exhausted. Irregular pains, attended with a dry cough and night sweats, are sometimes the consequence. For the most part, however, they are readily removed by an attention to diet and proper medicines.

With regard to the diagnosis, the complaint which has been most frequently confounded with rheumatism is that we are next to consider, the gout. The ancients, indeed, seem to have made no distinction whatever between the gout and rheumatism, describing them both under the common name of arthritis ; so that the term rheumatism is scarcely to be met with in their works. Trallius affirms, indeed, that the term was wholly unknown to them. It is used, however, by Cælius Aurelianus, and some others, who do not apply it however in the same way in which we do, for they still confound together the gout and rheumatism. So much did the ancients consider these complaints the same, that Aritæus says of the arthritis, it is a general pain in all the joints ; in the feet, called podagra ; in the hips, ischias ; in the hands, chiragra. Even to this day in many parts of Europe the diagnosis between these complaints is but ill understood. It will be readily understood after the reader has been made acquainted with the symptoms of both complaints. The rheumatism has also been confounded with the pains which occur in scurvy and lues venerea, from which however it may for the most part be readily distinguished, by the accompanying symptoms of these complaints and the diagnostic symptoms of rheumatism above pointed out. I have already had occasion to observe, that rheumatism is sometimes confounded with nephritis, and to notice the symptoms which generally serve to distinguish them. But rheumatism, when it is confined to the muscles of the loins, is generally a chronic complaint, and therefore not likely to be mistaken for nephritis.

The diagnosis between the symptoms occasioned by a calculus
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in the kidney without inflammation, and the chronic rheumatism seated in the muscles of the loins, is sometimes so difficult, that even Boerhaave in his own case was deceived. They are chiefly to be distinguished by the vomiting, frequent and painful micturition, and stupor of the inferior extremities, which generally attend the former, and the great increase of pain which attends the action of the muscles of the loins in the latter.

Fevers of various kinds, we have seen, are accompanied with severe pains of the back and limbs, which are often with difficulty distinguished from acute rheumatism, particularly when the excitement runs high. Neither Hippocrates nor Celius Aurelianus, Dr. Millar observes, have distinguished rheumatism from remitting fevers. The diagnosis in this case is chiefly to be collected from the relative violence of the symptoms and the particular seat of the pain. When the febrile symptoms are considerable compared with the degree of pain, and the latter not particularly fixed in the joints, the complaint must be regarded as a case of simple fever. When, on the other hand, the pains, particularly of the joints, are the most urgent part of the complaint, and the fever seems to increase or abate according as they are more or less severe, the case is then the acute rheumatism; for in this, as in the other phlegmasiæ, the general arises from the local affection. Besides, the pains which attend fever are not so much increased on motion as rheumatic pains are. The increase of pain on motion is the diagnostic of rheumatism most extensively applicable.

Ballonius, in his *Treatise de Rheumatismo et Pleuritide Dorsali*, is the first author who has accurately distinguished rheumatism.*

SECT. II.

Of the Causes of Acute Rheumatism.

ALL except the very young or very old are subject to acute rheumatism. Those between the age of puberty and thirty-five, Dr. Cullen observes, are most subject to it.

The same habit predisposes to rheumatism as to other inflammatory complaints. The plethoric are frequent subjects of it; but I have already had occasion to observe, that the phlogistic diathesis, as it is called, the tendency to inflammation, is not confined to the plethoric. It has been remarked of the rheumatism, indeed, that the cachectic are peculiarly its subjects; and it is an observation of Ballonius, that those who have laboured under putrid fevers are frequently attacked by it. These observations, however, apply only to the chronic rheumatism.

* Both Sir John Pringle and Dr. Millar say, they have been able to find no earlier account of this disease at all accurate.

Upon the whole, those of the sanguine temperament and a full habit are most subject to the acute form of this disease.

Rheumatism is more a disease of cold than of warm countries, and in the former it is most common in the colder seasons. Sir John Pringle ranks it among the winter diseases. It was seldom common in the army till after the beginning of the winter months. When the winter is not variable, however, it is more common in the spring and towards the end of autumn; for, like the other phlegmasiæ, it is rather excited by vicissitudes of temperature, than the uniform application of cold. All partial application of cold is particularly apt to excite it. There is no means of applying cold so pernicious as damp, especially if applied to the extremities, where the circulation is most languid.

The various causes of sudden plethora above enumerated often prove the exciting causes of rheumatism.

It is remarkable that Sydenham ranks among the causes of rheumatism the use of the Peruvian bark. This is only one of the many prejudices which have prevailed respecting this medicine. It is not to be overlooked, however, that where a tendency to the acute rheumatism exists, it may be increased by the bark, or any other means increasing the vis a tergo.

SECT. III.

Of the Treatment of Acute Rheumatism.

THE treatment of acute rheumatism is very similar to that of the phlegmasiæ in general. It differs from most of these complaints, we have seen, in not being apt to terminate in suppuration or gangrene, which occasions some difference in its mode of treatment.

The treatment may still be divided into general and local.—The general treatment in rheumatism does not resemble that of any complaint which has been considered, so much as of the synocha.

In most of the phlegmasiæ, particularly those last treated of, the danger of the inflammation terminating in suppuration and gangrene is such, that, setting aside almost every other consideration, our view is directed towards preventing these terminations; so that it is not uncommon for the patient, after escaping from the phlegmasia, to fall into dropsy and other diseases of debility. In the acute rheumatism it is seldom advisable to push general evacuations till the local symptoms are relieved. In this disease the danger proceeds not so much from the local as from the general symptoms.

It is the latter, therefore, that we should chiefly have in view. Thus it is, that the treatment of acute rheumatism so nearly resembles that of simple fever. However severe the pains may be, if the general excitement is trifling, general evacuations must be sparingly employed. As in the simple synocha, the more powerful of the general means are only to be employed when the general excitement is such as threatens a great degree of subsequent debility.

It is true, indeed, that the appearance of typhus is not so much to be apprehended in the acute rheumatism, as in synocha. But profuse evacuations, besides sometimes inducing other diseases of debility, frequently change the acute into an obstinate chronic rheumatism, which may continue to torment the patient for many years.

It must not, however, be supposed from what is here said, that these means are rarely to be employed in acute rheumatism; the general excitement for the first days of the complaint is often such as warrants even repeated blood-letting. All that I would say is, that in the employment of such means we must attend to the state of the general symptoms, and not regard them as in gastritis and pneumonia, as means of allaying the pain. It is not to be overlooked, that, from the presence of the local affection, a less degree of excitement warrants blood-letting than in synocha. Sydenham in his early practice seems to have employed blood-letting with the view just mentioned, but he confesses that experience taught him that he had made too free an use of it in rheumatism. And although Dr. Cullen recommends more copious blood-letting in acute rheumatism than seems fully warranted by the experience of others, yet he observes, "that attempting a cure by large and repeated blood-letting is attended with many inconveniences." Upon the whole, general blood-letting is seldom found necessary in acute rheumatism after the fifth or sixth day, and at no time when the fever is abating, even although the pains should become worse.

Sydenham thought it of consequence in this complaint to let blood from the side most affected; but it would appear from later observation, that in general blood-letting it is of little consequence from what part the blood is taken.

Catharsis is much recommended in acute rheumatism, and as it tends less than blood-letting to debilitate, it may be used more freely.

Wherever the excitement is so considerable as to demand blood-letting, cathartics should only be employed for keeping the body regular. They are less powerful than blood-letting in diminishing general excitement, and when many joints are affected they may be hurtful by the frequent motion and consequent increase of pain which they occasion.

Catharsis is most useful when the excitement is not considerable. Even a moderate degree of excitement will sometimes prolong the pains ; and as cathartics generally remove such excitement, they often bring much relief. The mild saline or mercurial cathartics are the best. As the excitement in this complaint, particularly after the first or second blood-letting, is commonly such as indicates catharsis, there are few cases in which at some period or other it is not proper. In proportion as experience taught Sydenham to employ blood-letting less, it taught him to rely more on catharsis. Stork recommends a cathartic every third day after the excitement has been moderated by blood-letting ; but if the blood-letting has not been carried too far, a more frequent use of them is proper.

By some, however, this evacuation, as well as blood-letting, has been carried too far. It has been said that we should employ cathartics till the pains abate. But the fever often leaves the patient while the pains continue severe. Ought we then to reduce the strength by repeated cathartics when there are means more powerful in relieving the pains, and which debilitate much less ? When the fever is removed, cathartics, as where blood-letting is employed, are only necessary for the regular expulsion of the feces ; and clysters are preferable to cathartics taken by the mouth, when the patient is much debilitated, or when we are endeavouring to promote perspiration.

Emetics are seldom recommended in rheumatism ; some writers think that they are used with advantage after the excitement is moderated by blood-letting, but nauseating doses are preferable to such as produce vomiting.

The great advantage obtained from sweating in the chronic rheumatism, has induced practitioners to attempt promoting perspiration in the acute. Here we must cautiously avoid heating medicines and external warmth, means employed with much advantage in the former case. In the acute rheumatism we can only employ mild diaphoretics, and guard against exposure to cold.

There are few diaphoretics more powerful than nauseating doses of emetics ; and as these at the same time tend otherwise to allay the febrile symptoms, they are well adapted to the case before us. They likewise frequently answer the purpose of cathartics.

Many other medicines have been recommended with a view to promote perspiration, and all are said to have proved very beneficial. Among the chief of these is nitre, which by some practitioners has been given in very large doses. Dr. Brocklesby* seems to have trusted the chief part of the cure to this medicine ;

* His Account of the Diseases of the Army.

he gave to the amount of ten drams or more in twenty-four hours, in three, four, five, or six quarts of water gruel. Such quantities, he observes, in three or four days seldom failed wonderfully to relieve the patient, and very often wholly removed the complaint by the most plentiful and profuse sweats; and exhibited in this way, besides its other good effects, he remarks, it often supplied the place of other cathartics. When it produced the most salutary sweats, however, it seldom moved the bowels sufficiently, and then mild clysters were repeated at proper intervals. It is not improbable that Dr. Brocklesby rather exaggerates the success of his practice. Whether it is that physicians have not been able to hit upon means of making such quantities of nitre be retained, that their patients have refused to take them, or that the practice has not been found successful, it is difficult to say; but at present nitre is seldom used very freely in this complaint. Dr. Brocklesby's observations deserve the attention of those who practice in similar circumstances, that is, among soldiers who are of a more robust habit and more under command than other patients are.

Camphor has been very generally employed as a diaphoretic in acute rheumatism. Sir John Pringle gave it in combination with the carbonate of ammonia. He sometimes gave the latter without the camphor. Guaiacum and opium have also been recommended with the same view, both of which are very exceptionable, at least till the fever is much abated.

The excellent effects of guaiacum in the chronic rheumatism seems to have led to its use in the case before us.

Opium has been prescribed in this complaint with various intentions besides that of promoting perspiration. Some have given it in the evening with a view to relieve the pains, which, it has been observed are worse during the night; others with a view to procure sleep; but we have sufficient testimony of its bad effects when given at an early period. Sydenham observes, that more blood-letting was necessary in those cases where opium was used; and Stork remarks, that when we attempt to procure sleep by paregorics, the patient becomes restless and giddy, troubled with distressing dreams and starting during sleep, which, instead of refreshing, seems to fatigue him, the pulse becoming frequent, unequal, and contracted. Van Swieten, Dr. M'Bride, Dr. Brocklesby, and others, make similar observations.

There is still another purpose for which opium has been recommended in acute rheumatism. It has been common with some practitioners to give it after evacuations with a view to restore the impaired strength. Sydenham gave it after the operation of cathartics. And if we were, with Sydenham, to exhibit these chiefly after the violence of the disease is abated, this use of opium would be less exceptionable. If opiates are used at all

while the fever is considerable, their operation must be directed to the skin by combining them with other diaphoretics.

The Peruvian bark has been found eminently serviceable towards the decline of the disease when the fever returns at intervals, assuming more or less the form of an intermittent.* Some have recommended the Peruvian bark, Dr. Cullen observes, at an earlier period, but it is proper in those cases only in which the phlogistic diathesis is much abated, and where at the same time the exacerbations of the disease are manifestly periodical.

It has been recommended to impregnate the system with mercury in acute rheumatism, but, except used as a cathartic as above mentioned, mercury seems of little service in this form of the complaint. In the chronic rheumatism it is often of service to charge the system with it, but in general so severe a remedy is not necessary.

The diet in acute rheumatism should be the same as in other inflammatory complaints, mild and diluting. And the patient must be permitted to return very gradually to his usual mode of living, that he may not suffer a relapse.

The temperature of the patient's room should be as uniform as possible and rather cool. Some advise that he should be laid in blankets in order to promote perspiration and prevent taking cold. This is more necessary in the chronic rheumatism, where profuse sweating is more frequently employed, and the patient is more susceptible of cold.

Among the local remedies blood-letting holds the chief place. While the pains are general, local blood-letting should never be employed. It is impossible by scarifying one joint to relieve the rest. It is after the fever remits, when the pains still continue severe, and fix themselves chiefly in a few of the joints, attended with some degree of redness and swelling, that it is of most service. And as it does not much affect the system in general, it may be repeated as often as the local symptoms become urgent.

Although blisters are less proper where inflammation is very considerable, after it has been to a certain degree reduced, their effects will be found more permanent. The same observation applies to them as to local blood-letting. It is when the pains are chiefly confined to a few joints that they are to be employed; at an early period indeed, when the pains are general and the pulse hard, they may do more harm than good.

Rubefacients often relieve the pains, but in general when driven in this way from one joint they are apt to attack another. Fomentations are also of service after the fever has abated. The actual cautery has been employed, and is still recommended

* Van Swieten's Comment. Dr. Millar's Diseases of Great-Britain, &c.

by some practitioners on the Continent in certain cases of rheumatism. This remedy, it may safely be affirmed, should be banished from medicine; its effects may always be obtained by less formidable means.

What has been said on former occasions respecting the encouragement of the symptoms found critical in the phlegmasiæ, is applicable here. If a tendency to sweating shews itself, it is to be encouraged by every means that do not tend to increase the febrile symptoms. We are also to favour any tendency that may appear to hemorrhagy. If an eruption brings considerable relief, we may for a day or two discontinue the evacuating plan; but if the eruption appears without bringing relief, it should occasion no change in the mode of treatment. It is observed above, that the drying up of ulcers has sometimes occasioned rheumatism as well as the other phlegmasiæ; when, therefore, this complaint terminates in any kind of ulceration, we must not attempt to heal it too suddenly.

CHAP. XIX.

Of the Gout.

THERE are few complaints of more importance, or on which more has been written, than the gout; and there is none, perhaps, on which so much has been said to so little purpose. A thousand treatises have promised certain means of removing it, and an unanswerable explanation of its phenomena; but on examination it has constantly been found, that the former were fallacious, and the latter merely hypothetical. It is true indeed, that although we can very rarely attempt the cure of the gout, experience has greatly improved the mode of treatment in it, by pointing out how far and by what means relief may be obtained without endangering life. But to those who know how great a number of works has appeared, particularly in late times, with the express view of unfolding its nature, it will appear a strange assertion, yet it is a just one, that however much the history of this disease may be improved since the revival of literature, all our reasonings respecting its nature, all our theories concerning its proximate cause, are as unsatisfactory as the neglected hypotheses of the ancients. The treatment improved rapidly as soon as physicians began minutely to attend to the progress of the disease; and the account which Sydenham has given of its symptoms has been of greater service in extending the knowledge of the gout, and consequently improving the practice in it, than all that ever was written for the purpose of elucidating its nature.

Dr. Cullen defines the gout,

An hereditary disease arising without any evident cause, but preceded for the most part with some unusual affection of the stomach ; fever, pain of the joints, most frequently attacking those of the hands and feet, particularly the joints of the great toe, returning at intervals, and often alternating with affections of the stomach or other internal parts.

It might be objected to this definition, that it does not very accurately include all the varieties of gout ; it would be difficult, however, to give a better definition, of a disease which assumes so many forms. It points out most of its striking features, and seems exceptionable only in the first clause, for a reason given when we were speaking of the definition of rheumatism.

Dr. Cullen divides the gout into four species, the regular, atonic, retrograde, and misplaced, which seem with sufficient accuracy to include its different forms. Other writers have divided it into more or fewer varieties.

Dr Cullen defines his first species,

Gout, with a sufficiently strong inflammation, continuing several days, and gradually receding, with tumor, itching, and desquamation of the part.

The atonic gout is defined, that in which there is a loss of power in the stomach or other internal part, either without the usual inflammation of the joints, or with only slight and transitory pains in them, often suddenly alternating with dyspepsia or other symptoms of atony in some internal parts.

The retrograde gout is that in which the inflammation of the joints suddenly recedes, and is immediately followed by atony of the stomach or other internal part.

Misplaced gout is that in which there is an inflammation of some internal part, the inflammation of the joint either having not appeared at all, or suddenly receded.

It will be proper to consider the symptoms of each of these species separately.

SECT. I.

Of the Symptoms of Regular Gout.

SYDENHAM, has given so full and accurate an account of the regular gout, that it is impossible to make any considerable additions to it. Later writers indeed have generally given a literal translation of it ; and those who profess to detail the symp-

toms of gout from their own observation, have added little or nothing to Sydenham's account of this disease, and often use his very expressions. This observation applies even to Dr. Cullen's account of it. The following account of the regular gout, therefore, is to be regarded as Sydenham's, interspersed with the few observations furnished by later experience.

The gout sometimes makes its attack very suddenly, particularly in those in whom it has not formerly appeared, or who have suffered but little from it; the violent pain being the first symptom that gives much uneasiness. In general, however, the inflammation of the joint is preceded by various symptoms indicating a want of vigour in different parts of the system. The patient is incapable of his usual exertions either of mind or body, becomes languid, listless, and subject to slight feverish attacks, especially in the evening, in which shivering often alternates with flushings of heat. He frequently complains of pains in the head, and coldness of the extremities. In short, all the symptoms which indicate derangement in the organs of digestion, occasionally appear. The appetite is impaired; the patient complains of a disagreeable taste in the mouth, and a sense of deficiency referred to the region of the stomach, as if it were wanting; with frequent vertigo, particularly on rising suddenly. There is an unusual heaviness after meals, which often becomes a disturbed kind of sleep, to which the patient is more or less subject at other times, particularly when the mind is slightly engaged while the body is at rest. He is never refreshed by this sleep, nor is his sleep during the night undisturbed, but such as leaves him languid and uneasy. Along with these symptoms, he is subject to flatulence, acrid eructations, heart-burn, spasms of the stomach, thirst, nausea, and vomiting. The bowels are seldom regular, being either costive or too much relaxed, often in consequence of part of the food remaining undigested and running into the acetous fermentation.

The state of mind in the different stages of the gout is as various as that of the body. At this period in general the patient is extremely irritable, and constantly anxious, often without being able to determine very well the cause of his uneasiness. He is alarmed at the least appearance of danger, whether from his complaints or any other source.

These symptoms are often accompanied by others which more peculiarly presage the approaching fit, such as a deficiency of perspiration in the feet, and their veins appearing more distended than usual, cramps of the feet and legs, and numbness and a sense of pricking in them, or a sensation as if cold water were poured upon them, which is sometimes felt in other parts of the body particularly in the back, and is described as different from the shivering which attends febrile attacks.

The duration of these symptoms, particularly the dyspeptic

symptoms before the fit begins, is various ; sometimes only a day or two, at other times many weeks. It is a very general observation, that the day preceding the fit, the appetite is greater than usual.

The fit sometimes makes its attack in the evening, but more commonly about two or three o'clock in the morning. The patient goes to bed free from pain, and is awakened about this time by a very acute pain, generally in the first joint of the great toe. The pain, Sydenham, who was much afflicted with the gout, observes, often resembles that of a dislocated bone, with a sensation as if tepid water were poured on the membranes of the part. After it has continued for a short time, it sometimes extends itself over all the bones of the tarsus and metatarsus, resembling the pain occasioned by the tension or laceration of a membrane ; at other times it occasions the sense of weight, and constriction of the part, which at length becomes so sensible, that the patient cannot endure the weight of the bed-clothes upon it, or the shaking of the room from a person walking across it.

At the commencement of the pain, a cold fit is more or less perfectly formed. As the pain increases, this is succeeded by a hot fit. The pain and fever increase, with much restlessness, till about the middle of the succeeding night ; after which they gradually abate, and in the most favourable cases there is little either of the pain or fever twenty-four hours after their first appearance.

As soon as the patient obtains some relief from pain, he falls asleep, a gentle sweat generally comes on before he awakes, and the part which the pain occupied becomes red and swelled.

Although in most cases the patient now enjoys ease, the fit is not over, for the pain and fever return in the succeeding night with less violence, and continue to do so for several nights, always becoming less severe till health is re-established.

Such is a simple paroxysm of the gout. But it often happens that after the pain is abated in one foot, it attacks the other, where it runs the same course as in the part first affected, which in those who have laboured under repeated attacks of the disease, is often seized a second time as the pain in the other foot subsides, which is again attacked in its turn, and the pain thus alternately occupies the one and the other for a considerable length of time. In other cases it seizes on both feet at the same time.

It appears from what has just been said, that a fit of the gout is composed of many paroxysms, which, in the most favourable cases, the pain being confined to one part, becomes slighter every night. In strong people, Sydenham observes, the whole fit, even although it attacks both feet, is generally finished in about fourteen days. In the aged and those who have been long subject to

the gout, it generally lasts about two months ; and in those who are much debilitated, either by age or the long continuance of the disease, it lasts till the summer heats set in.

During the fit the bowels are generally costive, the urine is scanty and high-coloured and deposits a copious red sediment, particularly during the first days. Through the whole fit there is a want of appetite and a sense of general heaviness and uneasiness, with rigors in the evening. While the fit is going off the patient often complains of an intolerable itching in the parts which the pain occupied, particularly between the toes, from which, and frequently from the whole foot, there is a desquamation of the cuticle.

A fit of the gout leaves the habit in better health than it enjoyed before it. The appetite, digestion, and spirits are unusually good, so that many declare that they would willingly endure a fit of the gout for the good health and spirits which succeed it.

The first attacks of the gout are generally at long intervals, for the most part three or four years ; at length they occur annually ; in those who have been long subject to it, twice a year, and at last several times during the autumn, winter, and spring. Upon the whole it may be remarked, that the more tedious the fits of the gout, the less severe is the pain, the more urgent are the dyspeptic and other atonic symptoms, and the sooner the fit recurs.

Sydenham admitted no other variety except those described to be regular. When the gout left the feet or attacked other parts at the same time, he believed the natural course of the disease to be disturbed by debility or some other cause. Dr. Cullen, however, and other later writers, have with great propriety ranked as varieties of regular gout all cases which run the course here described, whether the pain be situated in the feet or other parts of the extremities.

After frequent returns of the gout, it begins to seize upon other joints besides those of the feet, particularly the joints of the hand, and at length the larger joints ; and when it attacks the knee and elbow, it often occasions a considerable swelling without any change of colour in the skin, which frequently, however, becomes inflamed. The pain sometimes attacks some of these joints and the feet alternately, and sometimes, though not so often, some of the joints of both the upper and lower extremities at the same time. When the tendency to gout is so great, the fits are long protracted, for it often happens that almost every joint of the body suffers ; the pain when it leaves one, immediately fixing in another. In these cases the patient is only free from the disease for a short time in the summer, so that the usual fit may be said to last for eight or ten months.

In the first attacks of the gout the joint soon recovers its strength and suppleness, but after it has recurred frequently, and the fits are protracted for months, the joints remain weak and stiff, and at length lose all motion. These effects are increased by concretions in the joints, which are often thrown out by suppuration, forming ulcers that sometimes prove obstinate. These concretions, however, are not formed in the cavity of the joint, but for the most part immediately under the skin.

I have already had occasion to observe, that as the paroxysms are protracted, the dyspeptic and other symptoms of debility increase, while the pains become less severe. When the fits are protracted for the greater part of the year, the patient is never free from such symptoms, which when the pains either do not supervene, or are very slight and wandering, form the species of gout we are next to consider.

Most people who have suffered long from the gout are more or less troubled with calculous complaints, and the nephritic paroxysms often alternate with the gouty.

Such are the symptoms of regular gout, which although it be called regular to distinguish it from other species of the complaint, is, in fact, most irregular in the violence and duration as well as the return of its paroxysms.

SECT. II.

Of the Symptoms of Irregular Gout.

THE term irregular has been employed to express every kind of gout except that we have just been considering, so that under it are comprehended Dr. Cullen's three remaining species of this complaint, of these the atonic is the most important.

We were not furnished so early with an accurate account of the other species of gout as of the regular. Sydenham describes the former with far less precision. The symptoms of the different forms of irregular gout are so various and deceitful, that an accurate account of them could only be expected from the united efforts of many. The reader will find an excellent account of irregular gout, in two treatises published by Dr. Musgrave, *De Arthritide Symptomata* and *Arthritide Anomala*. To save repetition, I shall, along with the symptoms of the irregular forms of gout, mention the causes which make it assume these forms.

To enter fully on a detail of all the symptoms which appear in what is called atonic gout, would be to give those of a large proportion of the complaints to which we are subject. It will be sufficient to enumerate the most striking features of its different forms.

The subjects of atonic gout are generally such as have for some time laboured under regular attacks of the disease ; this however, is not universally the case. In some constitutions the gout soon begins to assume the atonic form. When this form appears in those who have never suffered from regular attacks, it is very difficult to determine its presence, unless the affection of the internal part alternate with pains of the joints ; where, indeed, this does not happen, and the patient has not been subject to regular attacks, some maintain that the complaint is never to be regarded as gout.

The symptoms of the most common forms of atonic gout may be divided into three classes ; those it occasions when it attacks the abdominal viscera ; when it attacks the thoracic viscera ; and when it attacks the encephalon.

Morbid affections of the stomach, such as have already been mentioned as often preceding regular gout, but frequently more severe, are the most common symptoms of the atonic, flatulence, nausea, vomiting, severe pains in the region of the stomach. &c. and these symptoms often prove very speedily fatal. They are frequently accompanied with cramps in various parts of the body, particularly the trunk and upper extremities, which are generally relieved by a discharge of wind from the stomach. The general debility is often very great, the pulse sometimes intermitting, the state of mind anxious, irascible, and timid.

There are few complaints more deceitful than what has been termed the gout in the stomach ; sometimes, indeed, the pain is excruciating, and the patient dies in extreme agony. But in many instances he expires when the symptoms are not different from those which in ordinary dyspeptics might be pronounced free from danger. It is not uncommon for those labouring under this form of the gout, suddenly to die while they are conversing, and with so much ease, that death is sometimes announced by no other symptom than the head falling on the breast.

Besides the continuance of the gout, all other causes tending to debilitate the system dispose this disease to attack the stomach, in particular the causes which act more immediately on the stomach itself, excess in eating and drinking, a diet of difficult digestion, &c. It is observable, says Musgrave, that such as have an hereditary gout are more liable to attacks in the stomach, than those in whom the gout is accidental ; those who are born of old parents, than those born of young ; those who have a bad appetite and labour under a cold languid gout, than such as, have a better appetite and whose gout is more painful and attended with a greater degree of fever. The melancholic temperament, it is said, also disposes to the atonic gout. How far all of these observations are just it is difficult to say ; all that we know certainly is,

that the debilitated are more subject to this form of the disease, than the robust.

After the symptoms of dyspepsia have continued for some time, or indeed from their first appearance, they are sometimes accompanied by those denoting derangement in the whole intestinal canal. The patient begins to complain of a pain in some part of the belly, generally about the umbilicus, which gradually extends itself, increasing in severity and accompanied with obstinate costiveness, forming what has been termed the arthritic cholic, a complaint of great danger. Sometimes, though more rarely, a diarrhœa comes on, attended with much griping, and sometimes with violent tenesmus and bloody and dysenteric stools.

The functions of the abdominal viscera are seldom so much deranged without other parts partaking of the disorder. In the arthritic cholic the patient is often troubled with dyspnœa and cough, and with a sense of oppression and heaviness in the breast as if a weight lay on it.

The arthritic cholic and diarrhœa frequently make their attack in autumn, and continue to harrass the patient during the winter. who, at length quite emaciated and exhausted by the continuance of the disease, sinks under it.

These different affections of the intestines often succeed each other, both the diarrhœa and dysentery in particular are apt to supervene on the cholic; and when in such cases the diarrhœa is moderate, it often proves a favourable termination of the latter; but where the bowels are much weakened it is attended with great danger.

It is not difficult to conceive how dreadful a complaint dysentery supervening on a gouty cholic must often be. In many profuse hemorrhagies succeeded by extreme debility, coldness of the extremities and syncope suddenly destroy the patient. On examining the intestines in such cases we frequently find ulcers and abscesses in different parts of them.

The most frequent causes of such affections in gouty habits, are the unguarded application of cold, and the presence of much bile and other irritating matter in the alimentary canal.

All these affections of the stomach and bowels are for the most part accompanied with slight and irregular gouty pains in some of the joints, which, when they become more fixed and severe, often bring very sudden relief to the more internal complaints; so that these affections often alternate, as I have myself observed, protracting the fit for many months, the prognosis being more favourable according as the pains of the joints are more and the symptoms of debility less considerable.

Such are the disorders which atonic gout occasions in the abdominal viscera. In the thoracic, its effects are often no less distressing and dangerous.

After the sudden application of cold, or receiving into the stomach any thing of difficult digestion, a gouty patient will sometimes become restless and uneasy, cold sweats breaking out, the countenance becoming pale, and the pulse weak and intermitting. These symptoms are often succeeded by a fit of palpitation, or the pulse failing altogether, he falls into syncope.

As these affections come on, the pains of the joints, if there are any, abate, and without speedy assistance the patient often expires.

The gout sometimes appears in the form of asthma, particularly in those who from a bad conformation of the chest or from being of asthmatic parents are disposed to this complaint. The asthma from gout, like the common asthma, is either dry or moist, the latter being least dangerous. They are both speedily removed by the coming on of gouty pains.

There is a complaint of the chest, termed a gouty defluxion, which resembles peripneumonia notha, frequent in old people who have been long subject to the gout and in whom it does not return in very regular fits. This affection is occasioned by the same causes which produce pneumonia, and whatever else occasions the gout to assume the atonic form, that is, every thing which tends to debilitate. The expectoration in this complaint is at first thin and scanty, becoming afterwards thicker and more copious, oppressing the lungs, and sometimes even occasioning suffocation.

This disease of the lungs frequently returns at intervals, beginning with a troublesome cough. A cough, indeed, is a very frequent symptom of atonic gout, even where the lungs are not the chief seat of the disease. It often precedes the other symptoms.

Affections of the lungs in those who have long laboured under gout, sometimes assume the form of the phthisis pulmonalis.*

It remains to make some observations on the effects of the gout when it attacks the encephalon. It then produces head-ach, giddiness, palsy, and apoplexy, sometimes loss of memory, and even mania. It is not uncommon for head-ach and giddiness, accompanied with a florid countenance, noise in the ears, a large pulse, and dyspnœa, for some time to precede palsy and apoplexy, and in a gouty habit, unless these symptoms are removed by the appearance of some other form of the complaint, they generally end in this way, sometimes after continuing for weeks or even months.

* See Musgrave's Treatises.

An indulgence in full living and indolence, especially after the meridian of life and where the habit is inclined to corpulence and plethora, particularly disposes to this form of the gout; and in common with other cases of atonic gout, it may be occasioned by all the causes of debility.

Besides these effects of the atonic gout in the three cavities, it sometimes assumes other forms. The arthritic quinsey often seizes the patient while he is labouring under pains of the joints, and sometimes makes its appearance a short time after a regular fit. This form of the gout approaches more nearly in its nature to the regular gout. It sometimes supplies the place of a regular fit, and is succeeded by the same health and cheerfulness, and it more frequently than other forms of atonic gout, if it deserves that name, terminates in a regular fit.

The people most subject to gouty quinsey are those with short necks and relaxed and debilitated habits. It attacks men about the middle period of life, and women after the menstrual discharge ceases. More fever precedes the quinsey than other forms of irregular gout. If, says Dr. Musgrave, from whose treatise this account of the gouty quinsey is taken, nausea and sickness of the stomach, heaviness numbness, and wandering pains have preceded this disease, there is reason to believe that it proceeds from the presence of gout in the habit, especially if the patient has formerly laboured under regular fits of the disease.* In all these circumstances the reader will observe the gouty quinsey is still found to resemble a regular fit.

The pains in the back, loins, shoulders, and external parts of the head, in gouty habits, resembling rheumatism, and which certainly partake much of the nature of that complaint Dr. Musgrave considers as symptoms of atonic gout. The pain sometimes fixes itself in the back, resembling a fit of the gravel, and is seated in the back bone and its membranes. This form of the gout seldom appears except in those exhausted by old age and the long continuance of the disease.

There is also a gouty ophthalmia as well as quinsey, which is known in the same way and terminates in a similar manner with the latter complaint.

Erysipelatous inflammation of the surface and impostume seem also occasionally to serve the purpose of a regular fit of the gout.†

In short, there is no complaint to which gouty people are subject that does not shew some connexion with this disease. The

* See the Rev. Mr. Warner's Account of his own case of gouty quinsey.

† Musgrave's Treatises, Dr. Gardener on the Gout and Gravel.

gouty humour, says Musgrave, sometimes falls on the glands within the orbits of the eyes, causing a discharge of sharp serum. Sometimes it attacks the gums and membranes surrounding the roots of the teeth. The nose, and lips, the tongue, and every part of the body, he observes, are subject to attacks of the arthritic matter. Dr. Whytt,* of Edinburgh, remarks, that he has seen the atonic gout in the form of diabetes, hemiplegia, mania, itching of the scrotum, dysuria, discharge from the urethra, and pain in the testicles. Every physician has met with similar affections connected with gout, the connexion appearing by their suffering a considerable abatement, or wholly disappearing, as soon as the gout shews itself in the extremities.

The more inflammatory of the foregoing affections may be thought more properly to belong to the misplaced gout, but this is a point of little importance.†

I have already had occasion to observe, that it is the opinion of many, that the gout never shews itself for the first time in the atonic form. The best observations I have met with in opposition to this opinion are those of Dr. Clark, in a paper on Anomalous Gout, in the third volume of the *Essays and Observations Physical and Literary*. The atonic gout, he maintains, will often remain for many years without any appearance of regular gout having preceded it. If so, it is of consequence to determine its presence, because the treatment is in some respects different from that of the complaint which it resembles.

Although Dr. Musgrave notices the appearance of atonic gout without any previous attack in the extremities, he does not attempt any diagnostic of such cases, but seems to think that their nature can only be ascertained by the appearance of regular gout.

Dr. John Clark, father to the author of the above paper, regarded white ropy semi-transparent filaments floating in the urine as a diagnostic symptom of atonic gout, when it appears without having been preceded by an attack in the joints. To this symptom the author of the paper adds strangury, which he met with in a large majority of such cases, and he thinks it a peculiarity of this strangury that it is generally relieved by blistering the ancles; but Dr. Whytt observes, that the same means relieve the slight strangury which frequently attends fevers. Dr. Clark remarks, that the matter thrown up from the stomach in cases of atonic gout, is generally a whitish gelatinous pituitous matter. Gonorrhœa in men, and the fluor albus in women, he thinks, are frequent appearances in this form of gout. Sauvages mentions the gonorrhœa podagrica among the species of gout.

* See the 3d. vol. of the *Essays and Obs. Phys. and Literary*.

† See Dr. Cullen's *Observations on the Gouty Affections of the Bladder and Rectum*.

Both Dr. Clark and Dr. Whytt think the atonic gout more common, especially among young people, than is generally supposed.*

After all that has been said on the subject, however, as the symptoms of atonic gout seem to be merely those of debility in some of the organs, and as debility in any part of the system may proceed from a variety of causes, it is probable we shall never detect any diagnostic sufficient to distinguish such cases with certainty, where the gout has not previously appeared in a less equivocal form. Besides, it is to be observed of atonic gout, that, if we except disorders of the stomach, an organ which so eminently sympathises with every part of the system, all the symptoms peculiar to this form of the disease, those of asthma, palsy, apoplexy, &c. are generally produced by the same causes which occasion these complaints in ordinary cases; the only difference is, that in gouty habits a less powerful application is sufficient, and even the dyspepsia of gouty patients is always observed to be most severe in those who are exposed to the peculiar causes of this complaint. It seems, therefore, that were we to adapt our language to the real state of our knowledge, instead of talking of the translation of gouty matter to the stomach, thorax, head, &c. in the various cases of atonic gout, we should only say, that the gout gives a predisposition to certain complaints, which being excited may occasion the gout itself in the same way that almost any derangement of the system will excite almost any complaint to which it is peculiarly disposed. Nor need it surprise us, that the appearance of regular gout relieves the atonic symptoms. How frequently does one complaint subside on the appearance of another, where gout is in no way concerned; and particularly a disease of debility when a painful disease supervenes. We often remove apoplexy and syncope by pain artificially excited. I have seen symptoms of dyspepsia and a sense of much debility suddenly relieved by a severe fit of tooth-ach.

On the symptoms of the remaining forms of gout, the retrocedent and misplaced, a very few words will be sufficient.

The retrocedent gout only differs from the atonic by being preceded by part of a regular fit.

The propriety of regarding what is termed the misplaced gout as a species of the complaint, is doubtful. It is unnoticed by Sydenham and many other writers. If the inflammation of the internal part come on without being preceded by any affection of the joints, how are we to determine that it is at all connected with gout. If it supervenes on the inflammatory affection of the joints suddenly receding, it may still proceed from other causes,

* The reader may consult the case of Mr. Alexander Small, Surgeon to the ordnance in Minorca, related by himself, in the sixth volume of the Medical Observations and Inquiries.

for many of those most apt to occasion a retrocession are also such as frequently excite visceral inflammation; so that it would not seem surprising if, in a few instances, such inflammation supervenes on a sudden retrocession of the gout, although there be no connexion between the complaints. Besides, if during a fit of the gout a visceral inflammation should by any cause be excited, we must suppose, from what we see in other cases, that it would relieve or wholly remove the affection of the joint. And instances of misplaced gout seem even rarer than from these circumstances we should expect to find them, even on the supposition that the gout has no share in producing them. It would appear upon the whole, therefore, that all we are to understand from misplaced gout is a visceral inflammation supervening in a gouty habit, to which, however, gout seems little, if at all, to predispose.

Although Dr. Cullen admits this species of gout, he confesses that he never met with any instance of it in his own practice, nor found any case distinctly marked by practical writers, except that of pneumonic inflammation. I am inclined to believe, that in this exception Dr. Cullen alludes to the pneumonia mentioned by Dr. Musgrave as a symptom of irregular gout. But what he says of it is not very favourable to the supposition of misplaced gout; for it would appear from his observations, that arthritics subject to pneumonia are such as must, independently of gout, have been predisposed to this complaint.

When the gout does not shew itself till late in life, it seldom rises to the same degree as when it appears more early, and it is less frequently accompanied with nephritic and other symptoms of irregular gout, as indeed might, a priori, be supposed, since the system is generally subject to gout for sometime before these symptoms shew themselves,* most of them being nothing more than symptoms of other diseases to which the continuance of gout predisposes.

There is no general rule, however, without exceptions. The gout, we have seen, is sometimes accompanied with the most dangerous atonic symptoms very soon after its first appearance. This, as we might suppose, is chiefly the case in habits peculiarly disposed to such affections.

SECT. III.

Of the Remote Causes of Gout.

THE gout is a disease of cold and temperate climates. It frequently makes its attack in autumn on the setting in of the

* See a paper, intitled a New Pathology of the Gout, by Stahl, in the sixth volume of Haller's *Disq. ad Morb. Hist. et Cur. Pert.* The reader will find some good observations on the gout in this and another paper by Hahn in the same volume.

cold, more frequently in the spring when the weather begins to become warm, especially if there are considerable vicissitudes of heat and cold.

Those most subject to gout are men of a robust and rather clumsy make, with large joints and head, a rough skin, rather corpulent habit, and, it has been said, of quick parts ; such as have led an indolent and luxurious life, used a large proportion of animal and high seasoned food, and indulged freely in the use of fermented liquors ; in short, who have been exposed to the causes which produce habitual plethora, and hurt the digestive organs, as well as those which debilitate the system in general, excessive venery, much application to study or business, vexation of mind, night watching, &c.

The gout more rarely attacks women and eunuchs. When it does appear in them, it is generally in such as are of the habit just described and have been accustomed to indolence and full living.

It has been a common opinion, that the ceasing of the menstrual discharge disposes to gout. But as this happens about the time of life at which the gout is most apt to shew itself in both sexes, and many women have been attacked by it before menstruation ceased, it is probable that it has little share in producing it. Dr. Cullen observes, that he has known several women subject to gout in whom this discharge was more profuse than usual. As a cause of plethora, indeed, the ceasing of this discharge may in some measure predispose to the disease.

There are few complaints in which an hereditary predisposition is more evident than in gout, and if this complaint appears before the middle of life, it is generally in those whose parents have laboured under it.

I have more than once had occasion to observe, that we can seldom with much accuracy divide the remote causes of diseases into predisposing and exciting. This observation applies to no disease more strikingly than the gout. We constantly find the same circumstance mentioned by one writer as a predisposing, by another as an exciting cause of this complaint. There are none of the causes just mentioned which do not occasionally excite the gout, without the co-operation of any other which we can detect, yet compared with other causes of gout, they may be termed predisposing, because they act merely as such in a large proportion of cases. It will be proper to make a few observations on the chief of those causes. On viewing, in general, the people of a country where the gout is prevalent, we find some subject to it from very slight irregularities, while others are exposed to the same or more powerful causes, and yet escape it ; and, on enquiry, it is generally found that the fathers or other progenitors of the former had laboured under this complaint.

This observation has been so often made by the vulgar, as well as physicians, that there is not a point in medicine better ascertained. Yet, notorious as it is, by some it has been called in question, and has even been made the subject of serious discussion. When we read Dr. Cadogan's fallacious arguments against the opinion of an hereditary gout, and the refutation of them by Dr. Berkenhout and Dr. Falkoner, we are less surprised at the hypothesis of the former, than at seeing the latter authors set about gravely to refute it.

There are few people in whom the hereditary disposition to gout is so strong that it is capable of exciting this disease without the concurrence of some other of its causes, so that there are scarcely any sprung, even from the most arthritic parents, who may not escape it by temperance and exercise ; and, on the other hand, there are few in those countries where the gout is known, so free from the predisposition that it may not be excited in them by an opposite mode of life.

That indolence predisposes to gout appears from its rarely afflicting those who have followed any laborious occupation. It has often been observed, that although common soldiers are far from leading a temperate life, they are seldom subject to gout ; while, on the other hand, professional men, and persons engaged in other sedentary occupations, often find the strictest attention to temperance insufficient to prevent its attacks. It is the indolence of literary men, Dr. Gardener observes, which has given rise to the opinion of abilities indicating a predisposition to gout. There may be some truth in this observation ; at the same time long and intense application of the mind seems to deserve a place among the predisposing causes of this disease. The bad effects of nightly study, indeed, are partly to be attributed to its encroaching on the hours allotted to sleep.

With regard to the kind of diet which predisposes to gout, although it is granted on all hands that intoxicating liquors, as well as much animal food, predispose to this disease ; yet there is great difference of opinion concerning the kind of intoxicating liquors which have most of this tendency. In this country we accuse wine of giving the strongest predisposition to gout, because the lower ranks are little subject to it. In them, however, the tendency may be counteracted by other causes. But there are not wanting less equivocal observations, which seem to prove the greater tendency of wine than beer to predispose to this disease. Van Swieten observes, that when the people of Holland drank malt liquor the gout was hardly known, but has become very common since the introduction of wine. " I will not take upon me to determine," says Dr. Cheyne, in his *Observations and Mode of Treatment of the Gout*, " but I believe the fact is, both in the stone and acquired gout, that those who only drink

"malt liquors, without wine or spirits, are seldom violently afflicted with either."

But what shall we say of such observations when we find them contradicted by others, which seem equally deserving of credit. Liger, professor of physic in the University of Paris, observes, that in Champaign and Burgundy, where the people drink nothing but wine, the gout is hardly known; and Hoffman agrees with this writer, that beer is more apt to produce gout than wine. Liger admits, that sweet wines predispose to this complaint; and it is a very general opinion, that the most acescent wines have most of this tendency. This, however, appears doubtful, for although acescent wines, and whatever else occasions much acidity in the *primæ viæ*, tend to excite fits of the gout in those who are subject to the disease; yet it seems, from a great variety of observations, that the stronger wines are more apt to give the predisposition. Liger makes the same observation respecting beer and cyder; the strongest he found most to predispose to gout.

Whatever be the comparative effects of wine and malt liquor in predisposing to gout, it seems to be pretty generally admitted that few liquors have so much of this tendency as cyder and perry; but in this perhaps authors still confound the causes most apt to excite the fit in those who are subject to gout, with those which predispose to it.

It seems in general to require a combination of the two last mentioned causes indolence and intemperance, to produce gout, where there is little hereditary disposition to it.

Where the hereditary disposition is strong, very slight circumstances are capable of exciting the complaint, nor can the strictest attention to temperance always prevent its appearance. Proofs of this we see in our own country; and we are told of people who use almost solely a vegetable diet, generally drink water, and attain an old age, and, notwithstanding are greatly afflicted with gout.*

When we consider how constantly symptoms of dyspepsia precede fits of gout, and that every cause which weakens the digestive organs seems to predispose to this complaint, it will appear more than probable that the very general use of tea and coffee has contributed with other causes, to render the gout more general. It is chiefly, perhaps, by affecting digestion that the various causes of debility above enumerated predispose to gout.

Of the occasional causes of gout, Dr. Cullen justly observes, that although physicians have pointed them out with confidence, in a disease depending so much on predisposition they must be

* See Prosper Alpinus *Med. Ægyptiorum*.

uncertain ; in the predisposed the occasional causes are not always evident. and in those not predisposed they are often applied without effect.

I have already had occasion to hint, that many of the causes which have been enumerated, if applied suddenly and to a considerable degree, act as occasional causes. A single fit of intoxication, or any other cause which greatly deranges the digestive organs, may excite the gout in the predisposed.

The following are the causes of dyspepsia, which seem more peculiarly to belong to the exciting causes of gout : Exposure to a moist cold air without exercise, acescent food and food of difficult digestion. unusual repletion of the stomach, obstinate vomiting, acids, either vegetable or mineral, taken in considerable quantities, a collection of bile or other irritating matter in the stomach and bowels.

There are many of the occasional causes of gout which less immediately affect the stomach excessive evacuations of any kind, or a want of habitual evacuations, particularly costiveness or a want of free perspiration. Checking the perspiration suddenly is one of the most frequent causes of gout. Chiefly to this cause, perhaps, is to be attributed the returns of gout in spring and autumn, when the weather being variable the perspiration is most apt to suffer a check. In some the feet almost constantly sweat ; when this is the case, immersing them in cold water, or otherwise suddenly cooling them, is a frequent occasional cause of gout. An external injury done to any of the joints liable to gout, often excites it in the predisposed. The truth is, that every cause which suddenly affects to a considerable degree either the general health or the part which the gout occupies, may excite a fit. The passions and even the imagination may occasion fits of gout. A piece of bad news has often had this effect. A late professor of the practice of medicine, it is said, often began to cripple as soon as he began to lecture on gout.

Some respectable writers believe the gout to be in some degree contagious. Both Boerhaave and his commentator Van Swieten are of this opinion. As the gout is so common, however, the opinion must have been more general were there any foundation for it.

SECT. IV:

Of the proximate Cause of Gout.

THE hypotheses concerning the proximate cause of gout, like the specifics held out as never-failing remedies in it, are endless : like these, too, their pretensions are universally ill-founded, and they have all done more harm than good. I shall not, therefore,

spend time by entering on any consideration of them. It will be sufficient to enumerate some of those which have been most prevalent.

None has prevailed so generally as that which supposes the gout to proceed from the presence of some morbid matter in the blood. What this matter is has been a fruitful source of dispute. Some assert that it is the natural fluids of the body changed by putrefaction or become viscid; others that it is a bilious humour; some that it is a mucus; others that it is a tartarous or urinous salt; by some it is supposed to be an earth; by others a volatile alkali; by others an æther; some maintain that it is the superfluous part of the chyle; and others that it is an acid. This last opinion has been long prevalent, and many regarded it as confirmed by the experiments of Scheele on urinary calculi; for at one time people persuaded themselves, without looking for any proof of their opinions, that the matter of urinary calculi and gouty concretions is the same,* and that the presence of this matter is the cause, not the consequence of gout. With regard to all the foregoing opinions respecting morbid matter as a cause of gout, it is only necessary to make such general observations as render it probable that the gout does not proceed from morbid matter of any kind, and certain that no person has proved it to do so. This the reader will find done in the 529th paragraph of the First Lines of Dr. Cullen.

Dr. Cullen is more successful, however, in refuting the opinions of others respecting the proximate cause of gout, than in establishing his own, which he gives in the following paragraph.

After premising some observations, for which I refer to his work, as by keeping in mind the history of the gout above delivered, the following passage will be sufficiently understood without them, he continues, "In some persons there is a certain vigorous and plethoric state of the system, which at a certain period of life is liable to a loss of tone in the extremities. This is in some measure communicated to the whole system, but appears more especially in the functions of the stomach. When this loss of tone occurs, while the energy of the brain still re-

* It appears from the experiments of Dr. Wollaston, (*Observations on Gouty and Urinary Concretions*, by W. H. Wollaston, M. D. Phil. Trans. p. 386, part ii. 1797) that the gouty calculus is the lithiat of soda, which never forms the urinary calculus, nor indeed seems ever to enter into its composition. See Fourcroy's twelve species of urinary calculi.

From the experiments of Fourcroy and Vauquelin, (*Sur l'Analyse des Calculs Urinaires Humains*, par les Cit. Fourcroy et Vauquelin, *Annales de Chimie*, No. 95, p. 213) the various urinary calculi are found to be composed of one or more of the following substances, lithic, or uric acid, uric of ammonia, phosphat of lime, phosphat of ammoniaco-magnesia, oxalat of lime, silex, and animal matter.

“ tains its vigour, the *vis medicatrix naturæ* is excited to restore the tone of the parts, and accomplishes it by exciting an inflammatory affection in some part of the extremities.” This account of the proximate cause of gout amounts to little. By the operations of the *vis medicatrix naturæ* we only mean certain unknown changes which take place in the system, and which are so termed because they seem to conduce towards the restoration of health. Let us substitute the meaning of the term operation of the *vis medicatrix naturæ*, in Dr. Cullen’s account of the proximate cause of gout, for the term itself, and we shall find it changed into little more than a concise account of the progress of the regular form of the disease.

The same observation applies to what he says of the nature of irregular gout.

Various other hypotheses have been advanced concerning the proximate cause of gout. It has been said to arise from a vitiated state of the nerves ; to be an attempt of nature to recover the infantile permeability of arteries closed up by exercise ; to be a spasm of the alimentary canal, communicated to the extremities. In short, there is no end to hypotheses concerning the nature of the gout, and every new one is just as unsatisfactory as those which preceded it ; so that all we are taught by the volumes which have been written on the proximate cause of this disease, is the great obscurity of a subject which has wholly eluded the researches of so many.

SECT. V.*

Of the Treatment of the Gout.

THE gout is very generally regarded as an incurable disease, so that the view in regular practice is rather to palliate than remove it ; for notwithstanding all that has been said on the effects of diet and exercise, if we except a few cases where the predisposition is very inconsiderable, we shall find, that these means have failed to prevent the returns of the gout, however much they may have mitigated its severity. It is true that we are possessed of means capable of preventing the returns of the paroxysm, but what is the invariable consequence ! I shall have occasion to call the reader’s attention to these in speaking of the different specifics which have been recommended in this complaint.

* Dr. Kinglake (see his Treatise on the gout) is wrong in supposing himself the first who regarded the gout as of the same nature with the other phlegmasiæ. This work was prepared for the press before I read either Dr. Kinglake’s Treatise or any of his papers on the subject. This I mention, that he may not suppose my censure of those who have maintained this opinion aimed at him.

But however incurable the gout may be, we shall find that there are means capable of obviating, perhaps, any predisposition to it, provided the disease has not actually appeared, or only slight symptoms have shewn themselves.

We shall consider the treatment of gout in the same order in which the symptoms were detailed.

1. Of the Treatment of the Regular Gout.

The symptoms of gout, it appears from what has been said, differ in some very essential particulars from those of the other phlegmasiæ, particularly in their constantly returning, however carefully the exciting causes are avoided, and in their giving a tendency to more alarming complaints. The same circumstances influencing the principles on which the treatment of gout is conducted, render them very different from those which regulate our practice in the other phlegmasiæ. In a paroxysm of the gout it is not our chief aim to remove the inflammation ; this indication, indeed, is often wholly overlooked. The objects we have chiefly in view are, so to remove the paroxysm that the succeeding interval may be as long as possible, and that any tendency to atonic gout may be obviated, the danger in gout proceeding neither from the local affection nor the general excitement, but from the paroxysms becoming frequent and irregular.

At the same time the debility left by a severe fit seems itself to dispose to irregularity, and the distress occasioned by it is so great that we are called upon to alleviate the patient's sufferings as far as can be done with safety. Some, indeed, have asserted, that the means of diminishing the pain are not only safe, but, by rendering the paroxysms less debilitating, tend to prevent the atonic forms of the disease. This maxim, however, is to be admitted with much caution ; it is only in certain cases and to a certain extent that it can be reduced to practice.

The constant tendency of gout to recur, and at length to assume the atonic form, renders the advice of the physician as necessary after, as during the paroxysm. Our aim is still the same, that of prolonging the interval, and rendering the succeeding fit regular.

Such are the principles on which the treatment of gout is conducted. It appears from what has been said, that during the paroxysm two indications present themselves, which so far stand in opposition, that they cannot both be fulfilled to any considerable extent. If we use vigorous means for the relief of present suffering, we endanger the future health ; if we attend to the latter only, we have it but little in our power to mitigate the former. As we cannot hesitate which plan to adopt, all that is necessary in laying down the treatment of a regular paroxysm of gout, is to enquire what the means are which mitigate the sufferings of

the patient, and tend at the same time to insure, or at least not to endanger, his future health.

These means, like those employed in the other phlegmasiæ, are either general or local.

In the first place of the general means employed during a paroxysm of regular gout.

A physician, who had been accustomed to practice in the phlegmasiæ and never seen a gouty patient would not hesitate in a regular paroxysm to recommend evacuations very freely. He would soon, however, perceive his error. The inflammatory symptoms, indeed, would be relieved, perhaps wholly removed; but if the practice were persisted in as often as the fits returned they would sooner or later be succeeded by a more alarming train of symptoms. "*Sin autem, in paroxysmis subsequentibus phlebotomia jugiter utatur, podagra quam citissime etiam in juvene inveterascet. et intra paucos, latius imperium, seu potius tyrannidem propagabit, quam alias in multis extendere valuisset.*"*

There are few points in the treatment of gout concerning which practitioners are better agreed than the employment of blood-letting in the regular gout. Dr. Williams speaks as if it had been otherwise in America at the time his treatise was published (1774.) But all European physicians, if we except a few of little note (who seem very erroneously to regard the gout as of the same nature as the other phlegmasiæ) give nearly the same opinion of it which Sydenham gave above one hundred years ago. Blood-letting, therefore, he observes, is neither to be employed for preventing or alleviating the paroxysms of gout, at least in those who are advanced in age. For although the blood drawn during a paroxysm of the gout, like that drawn in pleurisy and rheumatism shews the buffy coat, yet blood-letting is as pernicious in the former, as it is beneficial in the latter. If blood be drawn in the intermission, he continues, there will be much danger of another paroxysm making its appearance, which will last longer, and be accompanied with worse symptoms, than the preceding. Yet Sydenham admits, that if the patient be young and heated by the immoderate use of fermented liquors, blood-letting may be employed at the commencement of the paroxysm.

Many late writers,† although they keep these maxims of Sydenham in view, have ventured to extend blood-letting at the beginning of the paroxysm to those cases where the habit is full, the excitement great and the local affection very considerable. "Sydenhami," says Dr. Cullen, "has given it as his opinion, that 'the more violent the inflammation and pain, the paroxysms will

* Sydenham De Podagra.

† Boerhaave, Van Swieten, M'Bride, Liger, Cullen, Cadogan, &c,

“be the shorter, as well as the interval between the present and
 “next paroxysm longer; and if this opinion be admitted as just,
 “it will forbid the use of any remedies which might moderate
 “the inflammation, which is to a certain degree undoubtedly necessary
 “for the health of the body. On the other hand, acute
 “pain presses for relief, and although a certain degree of inflammation
 “may seem absolutely necessary, it is not certain but that
 “a moderate degree of it may answer the purpose. And it is
 “even probable, that in many cases the violence of inflammation
 “may weaken the tone of the parts, and thereby invite a return
 “of the paroxysms.” Dr. Cullen therefore concludes that in the
 first paroxysms in the young and vigorous, general blood-letting
 may be practised with advantage, although it cannot with safety
 be frequently repeated.

Most of the authors just alluded to seem to have recommended blood-letting too freely, and it seems, indeed, to be daily more and more going into disuse; so that even in the cases mentioned by Dr. Cullen many object to it, experience seeming to evince that the habit often suffers least when the course of the paroxysm is least disturbed.

Most of the best writers on this disease have condemned the use of cathartics in it. Some Cheyne, Hoffman, McBride, Cadogan, &c recommend mild cathartics, but Sydenham declares, that even the mildest employed during the paroxysm tend to render it irregular. Boerhaave and Lieutaud make similar observations. Dr. Cullen makes no mention of them, and the Rev. Mr. Warner and others, who speak of their own cases, say they have experienced the worst effects from them, so that catharsis, it would seem, is more pernicious in the paroxysm than even blood-letting.

I shall presently have occasion to make some observations on the use of cathartics during the interval, at which time they have been chiefly recommended. In the mean time it may be observed, that it is common to exhibit a cathartic immediately after the paroxysm. This practice has chiefly arisen from a belief that catharsis at this period carries off the dregs of the disease; but it is found so far from having this effect, that it often renews the paroxysm. Sydenham confesses, that this opinion induced him to take a cathartic immediately after a paroxysm, the consequence of which was that he immediately fell into another.

There are only two circumstances which at this period seem to call for the use of gentle laxatives. Irritating matter sometimes accumulates in the alimentary canal during the paroxysm, which now and then occasions griping and diarrhoea; in which case a mild cathartic with dilution is generally proper. This should be kept in view during the paroxysm, that the stomach and bowels may not be so loaded as to render a cathartic necessa-

ry at this period. Cathartics have also been recommended for the purpose of removing an œdematous swelling of the feet, which sometimes comes on as the paroxysm declines. Gentle stimulating laxatives are the best for this purpose. The swelling, however, generally goes off without any remedy ; and it is at least proper to wait till we see whether it is about to do so before so doubtful a one is resorted to.

It often happens, that the bowels are costive during the paroxysm, which in many cases, we have seen, is protracted for a considerable time, so that some means of moving them is necessary. Although nothing but necessity should induce us to prescribe cathartics, there is no objection to the use of clysters. The mildest are the best, as our only view in employing them is the regular evacuation of the fæces.

There is some difference of opinion concerning the employment of emetics in the gout. Some think they are serviceable at the commencement of the paroxysm. Dr. M'Bride recommends some of the mildest to be given with wine if the patient is languid. Upon the whole, however, it seems to be the general opinion, that unless the stomach is loaded, this remedy is at least unnecessary.

Diaphoretics have been esteemed more useful in the intervals than during the paroxysm. The benefit derived in the paroxysm, however, from a gentle spontaneous sweat coming on towards morning, has induced many to recommend diaphoretics at this period. Dr. Cheyne observes, that after the fit is distinctly formed, particularly in complicated and tedious cases and when the patient is advanced in life, they are serviceable. Boerhaave, Van Swieten, Liger, Dr. Caverhill, and many others, are advocates for diaphoretics, especially when the paroxysm has arisen from any cause which tends to check perspiration. But it may upon the whole be observed, that much benefit has not accrued from this practice, and it is very generally laid aside. Sydenham even apprehended danger from it, although he considers an increase of perspiration safer than most other evacuations during the fit. He thinks, that increasing the gentle sweat which generally takes place during the remissions of the pain, or supporting it longer than it is inclined to flow, renders the disease more violent ; and he justly observes, that bringing out a sweat in this disease is rather the province of nature than the physician. The effects of a spontaneous sweat, and that excited by art, I have frequently had occasion to observe, are often very different.

There has been much difference of opinion concerning the use of opiates in the paroxysm ; for although there are scarcely any who think them altogether safe, some recommend small doses. Sydenham and Quinsey are among the authors who have given opiates most frequently in this disease. They were still given,

however, as a dangerous remedy. If the pain, says the former, is severe, the patient ought to keep his bed, and be contented with this remedy. If, however, it greatly exceed his patience, he may take a small dose of opium in the evening.

There is no writer who has bestowed such unlimited praise on opium in the gout, as the Rev. Mr. Warner. This author, not belonging to the faculty, and, indeed, betraying his ignorance of the present state of medicine in every part of his treatise, would deserve little notice, were it not that he suffered so much from gout in his own person and gave opium so fair a trial. Dr. Falckoner justly censures him for the confidence with which he speaks of its effects from a single case, which he probably would not have done had he been better acquainted with the different effects of the same medicine in different habits. I must refer the reader to his treatise for the facts on which his opinion is founded, and the manner, according to him the only proper one, of preparing the anodyne. A safe medicine, capable of relieving the torments and shortening the paroxysm of gout, is a great desideratum. And should Mr. Warner's anodyne prove innocent, it will be an invaluable addition to the remedies at present employed in this disease. The chance, however, is much against it, whether we regard the observations of very many writers, or the well known effects of opium in other cases. Nor is it to be overlooked, that Mr. Warner died very soon after the publication of his treatise.

The bad effects ascribed to opium exhibited during the paroxysm of the gout may be reduced to two heads, its occasioning the paroxysm, after a few hours of relief, to return with great violence, and its favouring, by the debility it induces in the organs of digestion, the appearance of atonic gout. Dr. Cheyne tells us, that by occasioning nausea and reaching, it is apt to bring the gout to the stomach. And Hoffman gives us the case of a gouty patient, who died suddenly after finding relief from this medicine. Many similar observations might be quoted.

From the tendency of opiates to induce the atonic forms of gout, they have been generally judged safer in the young and those who have been lately attacked by the disease, than in old people who have been long subject to it. Dr. Caverhill observes, that when the paroxysms are very violent, an opiate may be given to the young who have lately laboured under the gout, but if it be given to the aged, they become subject to palsy, apoplexy, and fever. On the other hand, it is chiefly in the young, that opium is apt to renew the paroxysm with so much violence, an effect, though sufficiently distressing, less dangerous than the former. It is to be observed, however, that a repetition of this must at length terminate in the atonic forms of the disease.

Dr. Cullen seems to have overlooked the former tendency of

opium, whence he pronounces its exhibition safest in the aged and those who have been long subject to gout. He however observes, that in young arthritics opiates may be given with advantage, after the force of the fit is broken, when the pain only returns during the night and prevents sleep; and the observations of others seem to support his opinion. Liger and some others of less note, Dr. Bennet, Dr. Williams, &c. seem not to admit even of this use of opiates, but their objection does not appear to be founded on observation.

Such are the general remedies recommended in a paroxysm of regular gout. The reader must observe from what has been said that it is seldom we have occasion to employ any of them to a considerable extent. The opinions of authors respecting them, however, have been so various, that a pretty full discussion of them was necessary. Before leaving the general treatment it will be necessary to make some observations upon the diet during the paroxysm.

Sydenham long ago pronounced the *dieta tenuis* the proper diet in a fit of the gout; and in the generality of cases physicians still agree with him. It is for the most part found safe to moderate the excitement by a spare and diluent diet, and this is necessary when the patient is of a strong full habit, has not suffered much by the former attacks of the disease, and has not been in the habit of using much wine or other fermented liquors, and when the inflammatory symptoms, both local and general, run high. But, on the other hand, when the patient has lived freely, when he has long been subject to attacks of the gout, especially when these have shewn a tendency to become irregular, when the system has fallen into a state of debility, or when the inflammatory symptoms do not run high, a low diet is improper. Under these circumstances the patient should be allowed a certain quantity of wine proportioned to his habits and his food should be partly animal. If he dislikes solid food, he should use broths.

In cases of much debility some recommend the food to be seasoned with aromatics and strong peppers. But although it is surely the safest plan to support the excitement wherever there is any chance of the inflammation receding or becoming too languid yet the stimulating regimen has doubtless been sometimes carried too far.* Disputes naturally lead to extremes. Respecting many parts of the treatment of gout there have been so many disputes, that few writers can be wholly relied on.

In short the diet during the paroxysm must be regulated by the age and habit of the patient, his usual mode of living, the length of time he has been subject to gout, the frequency of its attacks, the symptoms of former paroxysms and those under

* See Dr. Cadogan's Treatise on the Gout.

which he now labours, particularly the degree of general excitement and that of the pain and other local symptoms. If these circumstances are kept in view, we shall seldom be at a loss to determine what diet will best support that degree of excitement which is most favourable in the gouty paroxysm.

We are now to consider the local means employed during the paroxysm. Concerning these also there has been much difference of opinion, and we shall find upon the whole, that like the measures we have just been speaking of, few of them can be employed with safety.

There was a very early prejudice against local blood-letting in the paroxysm. Whether this prejudice in its full extent is well founded, has not been positively determined. It would seem, that blood may sometimes be taken with advantage from the inflamed joint in the young and vigorous.

Dr. Cullen observes, that when the pain is very acute, he believes that bleeding by leeches in the foot and inflamed part may be repeated with greater safety. I have known instances, he adds, of its having been practised with safety; but he confesses that he cannot determine to what extent it may be carried.—Hoffman recommends it freely, and Dr Gardener and others follow him. But they talk of it in so general a way, that it is evident their observations are not the result of experience.

From analogy it would seem, that local blood-letting, indiscriminately employed, must often prove a dangerous remedy; and its having been very generally abandoned, notwithstanding the relief it brings, is a sufficient proof of its having been found hurtful. The frequent repetition of it is particularly to be avoided, and it must not be attempted in the aged and those whose constitutions are already broken by the disease.

Many applications to the inflamed joint, for the purpose of mitigating pain, have been proposed. They have, however, been so often productive of bad effects, that Sydenham, Hoffman, and others most conversant with the gout, have, with the exception of flannel, almost universally condemned them. It will be necessary, however, to notice those which have been most generally recommended, and particularly such as are still in use.

“Blistering,” Dr. Cullen observes, “is a very effectual means of relieving and discussing a paroxysm of the gout, but has also so frequently had the effect of rendering it retrocedent.”—What is true of blisters is, with little change, true also of synapisms. The relief obtained by them in regular fits is always at the risque of producing worse forms of the disease. The same observations apply to the practice of stinging the part with nettles; applying to it various aromatic oils, mixed with camphire or different kinds of soap; various preparations of opium; en-

phorbium, boiled with wax and oil ; various balsams ; spirituous liquors alone, or with camphire. &c. The reader will find an instance, related by Hoffman, in which the external application of spirituous liquors repeatedly relieved the pain, but proved fatal. It is almost unnecessary to enumerate more of these applications. Every thing of a highly stimulating nature tends to relieve the pain. and seemingly, in proportion as it has this effect, to render the gout irregular. Quick-lime and even arsenic have been recommended, the last is the basis of Dr. Pitcairn's recipe for the inflamed joints. Hot bricks are recommended by some, which are less exceptionable, perhaps, than any of the foregoing applications. Sometime ago an application, which was said to relieve the pain and shorten the fit, made much noise at Paris. This has since been found to be nothing more than diluted muriatic acid. For the mode of using it the reader may consult Dr. Rowley's Treatise. Dr. Stukely. in a letter to Sir Hans Sloan, recommends rubbing the joints affected with warm oil. prepared in a particular manner. We are not informed of the mode of preparing it, but a variety of oils, that of cinnamon, of cloves, of mustard seed, &c. have been used by others in the same way, and as they are all now laid aside, they must have been found either useless or hurtful.

Oiled silk has lately been much celebrated as an application to gouty joints. This the reader will find recommended by several writers, particularly by Dr. Caverhill, who is in some degree whimsical in the effects he ascribes to it. The oiled silk is said to increase the pain, although it shortens the paroxysm, when the inflammation is superficial ; it is when the pain is deep-seated, we are told, that it brings most relief. It is sometimes applied alone, at other times over the flannels, and generally occasions a profuse perspiration in the part. Some, who are afraid of most other applications, think this may be employed with safety. Analogy, however, is much against it : and it is very generally laid aside in this country. By some it has been thought useful to increase the perspiration of the sound foot as well as the gouty.

No external application in gout has made so much noise as one used in the East and termed Moxa. It is the down of the artemisia, the mugwort. Sir William Temple, who used it in his own case, gives us an account of the manner of applying it. It is formed into a small cone, which is placed with its base on the inflamed part. The apex is then set on fire, and the cone continues to burn till the whole, or nearly the whole, is consumed.

" Upon the first burning," Sir William Temple observes, " I found the skin shrink all round the place, and whether the greater pain of the fire had taken away the sense of the smaller or no I could not tell, but I thought it less than it was. I bur-

“ned it a second time, and observed the skin about it to shrink and the swelling to flat yet more than at first. I began to move my toe, which I had not done before, but I found some remains of pain. I burned it the third time, and observed still the same effects without, but much greater within, for I stirred the joint several times with ease, and growing bolder I set my foot to the ground without any pain at all. After that, I had a bruised clove of garlic laid to the part that was burned, and covered with a large piece of diapalma to keep it fixed there.” He then walked with ease. “For the pain of the burning itself,” he observes, “for the first time it is sharp, so that a man may be permitted to complain.” He counted, he observes, six score and four as fast as he could during the burning of the moxa, and with the burning the pain of it ceased. The second burning was not so painful as the first, and the third much less painful than the second. The wound was not raw, but appeared scorched and black. In a short time a blister arose, which left a small sore that soon healed.

Sir William Temple afterwards repeated the application of the moxa with similar success. Van Swieten gives an account of the same operation, also performed with success on a person labouring under hereditary gout in Batavia.*

Some have attributed the effects of the moxa to a peculiar quality possessed by this substance, others with more probability to the burning. Sydenham does not speak much in favour of the operation, but thinks it may succeed as well with dry lint. But the effect, he observes, must be temporary and fleeting. Were we sure that even this character of the operation was just, it would be a valuable addition to the treatment in the paroxysm; but it has not been often enough employed to ascertain its safety; and we have every reason, from analogy, to dread the same bad effects from it as from other local applications. Dr. Cullen observes, that he considers the burning with the moxa, or other substances, a remedy of the same kind with blistering. “I have indeed,” he adds, “no evidence of its proving hurtful, but neither have I had any proper evidence of its having proved a radical cure.” Upon the whole, it may be observed, it will require a very long experience to establish the safety of any remedy of this kind, for even the most pernicious have been repeatedly employed before their bad effects appeared.

Among other local applications, that of cold has frequently been recommended. This seems to be one of the most successful, and chiefly perhaps on that account one of the most dangerous means of relief.

* For further particulars respecting the use of the moxa, the reader may consult the first volume of Sir William Temple's *Miscellanies*, and Van Swieten's *Commentary* on the 1278th aphorism.

In the present state of our knowledge it is safest, and consequently best, to abstain from any application to the part but that of flannel or soft new combed wool, which by tending to open the pores of the inflamed part, and forming a soft bed for it, allay the severity of the pain ; and if the relief they bring be not very considerable, we are assured, from general experience, that it is not at the hazard of greater sufferings.

The only part of the treatment during the paroxysm which now remains to be considered, is the means that have been proposed to strengthen the joint, which remains swelled, stiff, and weak after the pain has abated. They consist solely of such remedies as act immediately on the part, so that they belong to the head of local means. They might perhaps with equal propriety be ranked among the means employed during the interval. Bathing the part with cold water, rubbing with flannel and the flesh brush, and endeavouring to use the joints, are among the chief of these means.

As soon as the pain and inflammation are gone, the flannels may be laid aside, which should not, however, be done carelessly and all at once ; and the part dipped several times in the morning in cold water. If the patient complains much of the coldness, a little warm water may be added at first, and gradually diminished till the water is used cold. In the frictions of the joint some have recommended a variety of stimulating articles to be employed which do not, however, seem essential. Van Swieten observes, that although he orders the woollen cloths with which the friction is performed to be charged with the fumes of aromatics, yet he has found the same benefit from simple friction, which should be used for a quarter of an hour morning and evening. The only good effects of impregnating the cloths seems to be that of inducing the patient to employ the friction. If with these means he is constantly trying to move the joint, and is not much afraid of a little pain, he will soon walk about again, except the attacks of the disease have been frequent and severe.

Motion of the joint, indeed, has been recommended at the beginning of the paroxysm, with a view to cut short the fit. However successful this practice might be, there are scarcely any who would have sufficient strength of mind to have recourse to it. The reader will find some observations on it in Dr. Caverhill's Treatise. But it is better worth his while to read what Sydenham says of exercise during the fit. Few, however, have resolution to go into a carriage, as he advises, or use even gentler modes of exercise during the fit.

Certain applications to the joints have been recommended as means of restoring the strength without either friction or exercise. Hoffman recommends the volatile sulphuric acid and the balsamum vitæ with Hungary water. The reader will find Dr.

James's and other prescriptions of this kind in Mr. Warner's Treatise. Little or nothing is to be expected from any of them.

Nearly the same may be said of the applications recommended when concretions are formed. These have generally been either of an acid or alkaline nature. The diluted marine acid, the fixed alkalis, and quicklime, have been recommended. Van Swieten speaks of the benefit derived from a weak solution of a caustic fixed alkali in very strong terms, both in gouty and other tumors. The reader will find similar prescriptions in Hoffman's Section on Gout. Upon the whole, however, we generally find reason to agree with Sydenham, that the best means to keep the joints free from gouty concretions is exercise. He even observes, that he has seen such concretions of long standing resolved by exercise alone. When they make their way through the skin, if the habit is tolerably good, the wound generally heals readily with simple poultices.

When the patient is much reduced by the violence of the fit, and recovers his strength slowly, chalybeates and the bark are often serviceable.

Although the spirits and digestion generally become very good towards the end of a fit, yet it sometimes happens, that as the pain abates, some atonic symptoms similar to those which precede it make their appearance. Absorbents and stomachic medicines often bring relief, but unless the symptoms are urgent the fewer of these that are employed the better.

We are now to consider the most important part of the treatment of gout, the means employed during the intervals with a view to render these as long as possible, and the succeeding fit mild and regular. Sometimes, indeed, when the predisposition to the gout is not strong, when the patient is young and the disease has only shewn it-self in a mild paroxysm, we have it in view entirely to prevent its return. In both cases the means employed are the same.

I have already had occasion to hint that certain medicines have been employed for the purpose of preventing the return of gouty paroxysms even in the most inveterate cases. But a fatal and very extensive experience has convinced physicians of the danger of having recourse to them. After considering the regular treatment in the intervals of gout, it will be proper to make a few observations on the nature and effects of some of these medicines.

Although there are some medicines which have proved both safe and useful during the interval, our chief dependence is on a proper regimen; for much is not to be expected from any medicine we can venture to employ.

In the first place then let us consider the regimen, that is, the diet and exercise during the interval.

What was said of the causes of gout is sufficient to point out the proper diet. The symptoms of the disease, indeed, naturally lead us to that which experience has proved to be the best. We see the fit preceded by symptoms of debility, which points out a nourishing diet during the interval. At the same time we observe that the regular gout consists in a violent inflammation of the joints, by which we are led to avoid the diet which disposes to inflammation. Thus it is necessary to choose a proper mean. If the diet be too low, the fits will not only become more frequent, but will partake more of the atonic forms of the disease. If the diet be too full and stimulating, they will also become more frequent, and the inflammation will be more violent. It is true, indeed, that in this case they will for some time retain the regular form; but nothing is better ascertained than that the frequent repetition of regular paroxysms, especially if they be violent, soon impairs the vigour of the system, and induces the symptoms of irregular gout.

A proper diet has so long been regarded as among the most material parts of the treatment of gout, that there are few writers on this complaint who do not speak of it at considerable length. There is, however, much difference of opinion respecting it. By some the use of animal food is forbidden; by others it is particularly recommended, and bread and vegetables are condemned as apt to produce acidity. Some have wholly condemned the use of wine, even in those who have been accustomed to it. Others recommend it to all arthritics whatever.

The truth is, it is as impossible to lay down any regulations respecting diet in the interval, as in the paroxysm, which shall be universally applicable. As in the latter case, it must be regulated by the age of the patient, his habits of life, the length of time he has been subject to the gout, the frequency of the paroxysms, and the tendency which the disease has shewn to become irregular.

When the patient is young and has not been accustomed to intemperance, when he has only suffered one or two paroxysms of the disease and these have shewn no tendency to become irregular, he is then in the most favourable state for attempting a radical cure. His constitution is not yet habituated to the disease, and he can with safety use that kind of diet which has been found best suited to prevent the returns of the regular gout. It seems, from a variety of observations, that this diet consists chiefly, if not wholly, of milk and the more farinaceous vegetables. This, indeed, has been denied, but chiefly, it would seem, from such a diet having been prescribed in improper cases and not with sufficient caution; for a milk diet is so different from that generally

used, that even the young have not sufficient strength of constitution to bear the change if made too suddenly. It is only by degrees, and in the space of some months at least, that any arthritic should be permitted wholly to abandon the use of wine and animal food.

Some have thought it sufficient to persevere in a vegetable diet for a certain time, during which, if the gout has not made its appearance, they judge it safe for the patient to return to his former way of life. But Hoffman observes, that if this is done, the patient either has the fits renewed, or in their stead, particularly in debilitated habits, spasmodic complaints, colics, inflammations of the stomach, nephritic pains alternating with ischuria, supervene, and even death itself is often the consequence.

It is in very few cases, however, that a milk and vegetable diet can be prescribed with safety. When the patient is advanced in life, or has been accustomed to intemperance, when the vigour of the constitution is at all impaired, or even when the regular gout has frequently returned, it is not to be attempted. But although so great a change is improper, there is none of these cases in which some change is not to be made. If the patient has been intemperate, he must be allowed full living, but warned against any excess either in eating or drinking. If he has only been a full liver, he should be desired to eat and drink more sparingly, particularly to give up the use of animal food in the evening, and, according to Sydenham's rule, to confine himself to one dish at dinner. He should take only a few glasses of wine, which, if it does not become acid on the stomach, is better than distilled spirits in any shape. We have even reason to believe, I think, that he should prefer the weak wines to the strong, or if he drinks the former dilute them with water. If he finds this mode of life rather increase than diminish his strength, he may gradually accustom himself to drink less wine, till at length, perhaps, he will find that he can lay it aside altogether. But there is not a more dangerous maxim than Dr. Cadogan's, that the change should be made as speedily as possible. There are few physicians who have not seen its fatal effects. Upon the whole, it is a good general rule for gouty patients to confine themselves to one or at most two plain dishes, of which they may eat freely. There will then be little danger of their eating too much or too sparingly. And with respect to drink, it should, perhaps, be the view of every arthritic, whose constitution is still vigorous, to bring himself to use water only, or, what has been particularly recommended by Sydenham and others, whey, at least for his common drink.

While fermented liquors remain necessary, although wine is generally to be preferred, yet as it is particularly apt to become acid on the stomach when a fit is approaching, it may then be changed for a small quantity of distilled spirits diluted with water.

Dr. Falckoner has censured Dr. Cadogan for advising, that the diet of gouty patients be composed rather of solid than liquid food, and quotes Haller in support of the opposite opinion. Most dyspeptics, however, will agree with Dr. Cadogan. I have known even the smallest quantity of fluid taken during dinner derange digestion. It would seem, that the gastric fluid having its powers diminished in the dyspeptic, will not admit of any dilution.

Dr. Cadogan has been more justly censured for regarding bread as pernicious. Many arthritics, however, who have been long accustomed (as a large majority have) to consume great quantities of animal food with very little bread, complain of its oppressing the stomach and running into the acetous fermentation. But this proceeds not from any indigestible quality in the bread, but from the stomach not being accustomed to it. If the quantity be gradually increased, the arthritic will experience no inconvenience from it. And as it affords much nourishment, without tending to produce the fulness occasioned by animal food, when the stomach can digest it perfectly it should form a principal part of the diet of gouty patients.

Particular objections have been made to much salt, pepper, mustard, vinegar, and all kinds of pickles, and not without reason, for these are hurtful not only by the stimulus which they apply to the stomach, but by inducing the patient to eat more than he ought.

But no attention to diet is capable of prolonging the intervals and preserving the paroxysms mild and regular, if exercise be neglected. When the patient is strong enough, walking is better than any kind of gestion. Some have recommended more violent exercise, but this is not necessary. When it is employed, the patient must be brought to use it by degrees. It is true, indeed, we have heard of people of strong constitutions wholly cured of the gout by being subjected to much labour and abstinence. There are not a few instances, says Hoffman, of people having lost the gout with their fortunes. Van Swieten tells us of a priest, who was taken by pirates and condemned to the oar for two years which wholly cured him of the gout he had been long subject to. In general, however, all that we wish is, that the patient should walk regularly four, five, or six miles a day. Walking employs almost all the muscles of the body, and, being a moderate exercise, it can be continued for a considerable length of time. It seems to be on these accounts that it is the best.

In prescribing walking to arthritics who have been accustomed to indolence, they must be warned against fatigue, which counteracts all the benefits derived from it; and consequently brought by slow degrees to use a sufficient quantity of this exercise. With regard to those arthritics who cannot walk, or can-

not walk enough, they must ride on horseback, or if this is too much, in a carriage. If even this is not to be borne without fatigue, they should undergo morning and evening friction of the whole body, continued till they begin to feel some degree of weariness. Friction of the joints, indeed, while they remain stiff, should in no case be neglected. By these means the weakest arthritic will often be brought by degrees to bear the rougher exercises. It is to be observed of walking, however, that much of this exercise when the fit is expected, may bring it on, especially if the feet are at all cramped or otherwise injured.

The exercise of the mind is also a matter of some importance in the intervals of the gout. Nearly the same may be said of it as of bodily exercise. Any study which fatigues is injurious, and the constant languor of a mind wholly unoccupied is no less so.

The early part of the day is the proper time for the exercise both of the mind and body. Repose towards evening is particularly necessary to invalids. The observation made both on bodily and mental exercise during the interval of intermitting fever, are applicable here.

Some attention to the proper regulation of sleep is also necessary. Boerhaave recommends a great deal of sleep to his gouty patients; and within certain limits a large proportion of sleep is a powerful means of restoring strength. For this part of the subject I may also refer the reader to the chapter on intermitting fever.

Sydenham is among the very few writers who have taken notice of a choice of air in the treatment of arthritic patients. While the patient is using exercise, he observes, a wholesome air is to be preferred. Exercise in the country is better than exercise in the town, where the air is loaded with vapours and rendered still worse by the closeness of the buildings. Many from their own experience can affirm the truth of these observations; and I have known instances in which dyspeptic patients could not with twice the exercise in London preserve the same degree of health which they enjoyed in the country. It was supposed by many, till the experiments of several chemists demonstrated the contrary, that the air of great cities was less wholesome than that of the country, in consequence of containing a less proportion of oxygen. From many circumstances it would appear, I think, that the unwholesomeness of the air in great cities arises from its greater dampness; for a damp air occasions the same want of appetite, lowness of spirits, and other nervous symptoms in the debilitated, from whatever cause.

The cause of the greater dampness of the air of great cities is evident when we reflect on the experiments on which Dr. Hutton

has founded his theory of rain. Every cool breeze much charged with moisture must, by mixing with the heated air of the city, occasion a deposition of water, since it is found that the mean temperature will not enable the airs to hold the same quantity in solution which they do before they are mixed. And, in fact, in what part of this country are the fogs so common and in so great a degree as in London. I have myself observed when a sea breeze was passing over the country, that wherever it met with the heated air of a village, a considerable deposition of moisture took place. So that from each village a train of mist, proportioned to its size, extended itself along the country, in other parts of which the air remained perfectly transparent. But admixture of airs of different temperatures is often attended with a considerable degree of dampness, without going so far as to occasion mist, a state of the air to which the delicate are extremely sensible, and which in common language has obtained the name of rawness, partly perhaps from the rapidity with which, on account of its greater density, it abstracts the heat of the body. The bad effects of a damp air cannot be wholly attributed to its abstracting the heat with greater rapidity, since the same effects are not occasioned by a dry air however cold. Nor can a damp air be supposed to affect the lungs materially, which are always moist. The injury it does, seems to arise from the effects of the moisture on the skin, which in a thousand instances so remarkably sympathizes with every part of the system, and particularly with the stomach. All the symptoms occasioned by a damp air are such as indicate a want of vigour in the skin, and consequently of free perspiration, chilliness, loss of appetite, languor, &c.

Such are the circumstances to be attended to in managing the regimen during the intervals of gout. We are now to consider the remedies which have been found useful at this period. These, like the remedies recommended during the paroxysms, may be divided into general and local. In the first place, of the general remedies employed during the interval of the gout.

The impropriety of employing general blood-letting at this period is so evident, that very few have recommended it. It would rarely have much effect in rendering the succeeding paroxysm milder, and either by weakening the patient if he were advanced in years, it would tend to bring on atonic forms of the disease, or by increasing plethora, particularly in the young, increase the violence of the inflammatory paroxysms, and render them more frequent.

Physicians have been more divided in their opinions concerning the use of cathartics at this period. Hoffman thought that they might be employed a little before the accession, for the purpose of preventing the fit, and even observes, that general blood-letting has been successfully recommended with the same intention. Both are certainly very precarious. Cheyne recommends

mild cathartics throughout the whole of the interval ; Boerhaave and others, even those of a drastic nature ; but Sydenham has declared against them all at this period as well as during the paroxysm. There is the same objection to catharsis during the interval as to general blood-letting ; of the two, however, it is the least to be dreaded. In modern practice cathartics are only recommended for the purpose of keeping the bowels regular, and those are preferred which occasion least evacuation, aloes, rhubarb, magnesia, &c. The first of these, for reasons which will afterwards appear, is objectionable in gouty cases, where the constant use of a cathartic is necessary.

Some physicians have been so much afraid of debility during the intervals, that, not contented with abstaining from evacuations, they have endeavoured to support the strength by the Peruvian bark and other tonic medicines. These at first sight appear well adapted to the intervals of gout, but notwithstanding what many have said of them, they bear too near a resemblance to the specifics which have done so much mischief in this complaint, to be generally employed. The best physicians either do not mention them among the remedies of gout, or speak of them as very doubtful means.

Among the tonics which have been recommended in the interval, cold bathing holds a principal place ; but even this is a doubtful remedy, except in the young and vigorous, or at least those who enjoy very long intervals.

The opinions of physicians respecting the employment of the warm bath during the intervals, are various. Sydenham and some others of the best writers take no notice of it. The tepid bath, however, it is now ascertained, has not the debilitating tendency formerly ascribed to it, and in those who have become cripples from the gout it is often used with much advantage.—No remedy has been so much celebrated in this country as the Bath waters, used both externally and internally, for the purpose of fixing the gout when it shews a tendency to become irregular ; and for restoring strength and the use of the limbs after severe fits. It is not easy to ascertain with accuracy how far their reputation is well founded. That they are often of use in such cases is certain. Numberless authors have testified in their favour. The hot waters or Bourbon,* the waters of Aix-la-Chapelle, the Piermont and Seltzer, and many other mineral waters, have been celebrated in the gout, but do not seem equal to those of Bath. Common water impregnated with the carbonic acid gas has been warmly recommended and appears to be a good innocent stomatic.

Various remedies of another kind have been employed, which by their diaphoretic or other quality were supposed capable of

* See a Treatise, entitled *Bains de Bourbon*, by Dr. Aubery.

correcting or expelling from the body the morbid matter to which we have seen the gout so generally attributed. Many of them seem more safe than effectual, and indeed they have so seldom been attended with success, that their employment has not been sufficiently general, perhaps, to ascertain their safety.—Among these may be mentioned antimonial and mercurial medicines.

The accounts which Cheyne and others give us of the effects of mercury in gouty cases, speak but little in its favour. “The fact is,” says he, “that by a free and full salivation gouty people have been freed from all the symptoms of the complaint for several years; but it is also a matter of fact and experience, that a full and free salivation does so break, rend, and tear all the smallest, tenderest, and finest vessels and fibres, that the body becomes in a worse state, in respect to the future fits, than it would have been in several years time under the common symptoms.”

In the *Observations interessans sur la Cure de la Goute*, and other works mercurials are much recommended during the paroxysm. But I have not taken notice of them among the remedies of that period, as by the practitioners of this country at least they are very generally laid aside.

The reader will find antimonial medicines recommended by Dr. Cadogan, Dr. Jeans, and others. But it is observed by Dr. Falckoner, that they have been used without advantage, and that their continued use is to be feared, as they tend to hurt the stomach. Even Dr. Jeans says, that in some cases he has seen violent vomiting or purging induced when antimonials were given with a view to stop the fit.

Sulphur, ammonia, and a variety of other diaphoretics, have been recommended with the same intention, and many regard them as medicines of great importance. The general opinion seems to be, that much is not to be expected from them, and they will probably be found pernicious in proportion as they hurt the stomach. It appears, indeed, that it was chiefly the hypothesis of morbid matter which first induced practitioners to employ them.*

Such are the general means employed during the interval. Upon the whole it may be observed, that an attention to diet and exercise forms the most essential part of them. It is chiefly, in-

* There is some account of the success of sulphur water in gouty cases, and the mode of preparing it, in the eleventh volume of the Medical Commentaries. A variety of medicines have been employed with a view to prevent a return of the paroxysm. See the first volume of the *Acta Reg. Soc. Med. Haf.* A paper above referred to, by Dr. Clark, and one by Dr. Guthrie, in the fifth volume of the Medical Comment.

deed, when the gout has left the strength much impaired, that any thing else is necessary.

It remains to say a few words of local remedies at this period. There are only two which deserve notice, local blood-letting and issues. It was formerly common to apply leeches to or scarify the feet when a fit of the gout was expected, especially if the habit was plethoric, or any accustomed discharge had been checked. How far this practice might prove successful in preventing the recurrence of gout it is difficult to say, for the hazard of all means of this kind has banished them from modern practice.

It is observed, when from the breaking of gouty tumors or other accidents, ulcers are formed and continue to discharge matter, that the intervals of the gout are prolonged and the paroxysm rendered milder without any disposition being given, to the irregular forms of the disease. This circumstance suggested to physicians the propriety of making artificial ulcers in the legs, which are sometimes productive of the same good effects. It is necessary, however, for a gouty patient who has once submitted to this remedy, to keep up the discharge for life, as in such habits the worst consequences often follow the closing of issues, or even the drying up of sores, which have continued for a considerable time. In the latter case, indeed, issues should always be substituted for the sore, if this precaution be neglected, the fits frequently become as frequent as they were, or more so, and shew a greater tendency to become irregular. It seems to be an observation very generally applicable, that if gouty paroxysms be interrupted for some time, or rendered less frequent, by whatever cause, and in consequence of its removal or other means they recur with their usual frequency, they generally assume a more dangerous form.

Some ascribe the effects of issues to the irritation they occasion, and recommend frequently shifting their place, that the parts may not become callous. Their effects, however, seem in a great measure at least to depend on the evacuation they occasion, and frequently shifting them is very troublesome.

It is hardly necessary to add to what has been said of the treatment during the interval, that carefully avoiding the occasional causes of the complaint forms an essential part of it.

Such is the treatment of regular gout. Every age has tended to simplify it; and most of the numerous train of internal remedies, once so generally recommended in this complaint, are now regarded either as useless or hurtful.

Nothing remains to be done before leaving this part of the subject but to make some observations on the principal specifics which have been recommended for the radical cure of gout. There are few of these which are not composed of ingredients

which some physicians still venture to prescribe to a certain extent, and many of them are remedies on which the older physicians placed their chief reliance. Such is that which has lately made so much noise in this island from a supposed cure it wrought on the Duke of Portland.

The composition of this medicine is now known, and instead of being new, it is the same which was used in gouty cases as early as the days of Galen, since whose time it has often been in high repute, and as often fallen into disuse.*

What the effects of this remedy are is now very well ascertained; those who have used it according to the directions have indeed got rid of their gouty pains, but it does not appear that there is one instance of their being removed in this way in which the patient survived the effects of the medicine above a few years.† “I myself,” says Dr. Cadogan, “observed between fifty and sixty of the advocates of the Portland powder, some my patients, some my acquaintance or neighbours, who were apparently cured by it for a little while, but in less than six years time they all died to a man.” And Dr. Cullen observes, “In every instance which I have known of the exhibition of the Portland powder for the length of time prescribed, the persons who had taken it were indeed afterwards free from any inflammatory affections of the joints, but they were affected with many symptoms of the atonic gout, and all, soon after finishing their course of the medicine, have been attacked with apoplexy, asthma, or dropsy, which proved fatal.”

Although most physicians have wholly discarded a medicine universally productive of the worst effects, yet some, Dr. Jeans, Dr. Gardner, and others, have ventured to recommend it in smaller doses, especially to young arthritics. The ancients laid it down as a rule, that this medicine should not be administered to such as had been subject to gout above six or seven years. Even this is at least a precarious practice, though not more so, perhaps, than the daily use of other bitters and aromatics.

Some believe that these medicines are safer in infusion than in substance. This is probably true, as the former is less powerful; but still it is doubtful if the common use of them in any shape is safe. A circumstance which has not been sufficiently attended to

* The reader may consult a paper, intituled an Inquiry into the Origin of the Gout Powder, by Dr. Clephane, in the 1st. vol. of the Med. Obs. and Inquiries.

† To make this powder, take of the root of that species of bitwort termed *aristolochia rotunda*, of gentian root, of the tops and leaves of germander, ground pine, and centaury, dried, equal parts, reduce to powder and sift them. A dram of this powder is taken every morning for three months, three fourths of a dram, or according to some, two scruples, for three months longer, and for the ensuing six months, half a dram.

is, that it does not seem to be the medicine, but the checking of the gout, that occasions the fatal effects, and it is more than probable, that the use of any medicine capable of preventing the return of the regular fits would be attended with the same consequences. We have every reason to believe, that a person free from the gout might take the Portland powder, not for one year only, but for many years, without fatal effects.

It was observed above, that mercurials have been recommended in the gout. These have formed the basis of some specifics. The famous pills of Belloste are a mercurial preparation. The reader will find many cures by this specific related in the second volume of Belloste's Hospital Surgeon. Yet there is every reason to believe, that mercury is no safer specific in gout than the preceding. We have seen Dr. Cheyne's account of its effects. In the incautious hands of the empiric it is still more to be dreaded. Hoffman relates the most alarming and even fatal effects from a specific of this nature.

There are few remedies in the gout which have had, and indeed with many still have, so much reputation as preparations of the alkalis. From the frequent concurrence of gout and gravel, since alkaline medicines have been celebrated in the latter complaint, they have often been employed in gouty habits, and it is very generally admitted that they prolong the interval, whether with safety or not seems still undecided. We have reason from analogy to dread every medicine having this tendency, at the same time if these act merely by correcting acidity, which we know frequently occasions the gouty paroxysm, they may be less pernicious than those that make a more direct impression on the system.

Many specifics have at different times appeared which had alkalis for their base. It is rather in calculous, than in gouty cases, however, that they have been celebrated. Lieutaud, M'Bride, and other writers, speak with confidence of their effects in the latter complaint. But I have met with no one who bestows on them so much praise as Liger. Dr. Cullen, who wrote since these authors, although he thinks favourably of alkaline medicines in the gout, speaks with less confidence both of their success and safety.

It has been observed by other writers, that certain alkaline preparations are more hurtful than others. The caustic alkali combined with oils is more pernicious than alkali saturated with carbonic gas. On the other hand, the former preparation is the most-effectual.* A long continued use of the alkalis has occasioned a very bad habit of body, much emaciation, and debility.

* The following is Liger's manner of preparing the alkali in gouty cases. Olive oil is placed in a vessel over the fire, and while it boils, as much of a very pure caustic alkali is thrown into it as is sufficient to form

It appears, I think, from the various observations on this subject, that alkalis may be used with a view to alleviate the symptoms of gout, but ought never to be given in the large doses which some recommend with a view of removing the disease.

It would be spending time to little purpose to enquire particularly into the merits of many other medicines of this kind. The effects of all of them are similar. We may therefore permit the spirituous infusion of guaiacum, the Swiss tincture, Dr. Hill's elixir of Bardana, the Liege medicine.* Mr. Drake's specific, &c. to remain in the silence into which they are now sunk. These medicines during the interval (very few of them are recommended at other periods) are like local applications during the paroxysm. Few can be used with safety, and those which afford most relief are most dangerous. Whether or not a more extensive experience will shew that many of these specifics may be given with advantage in small doses, for the purpose of strengthening the digestive organs, to which most of them afford a degree of temporary vigour, seems at present very doubtful.

2. Of the treatment of the Irregular Gout.

We are now to consider the treatment of the various forms of irregular gout. It is evident that this part of the subject cannot be here entered upon at length, for that would lead to the treatment of almost all the complaints to which an arthritic is subject. All that can be attempted, therefore, is to lay down the general principles on which the treatment of the different forms of irregular gout is founded.

The reader will recollect, that in detailing the symptoms, I adopted Dr. Cullen's division of irregular gout, into atonic, retrocedent, and misplaced. I shall follow the same order in speaking of the treatment of these forms of the complaint.

Of the Treatment of Atonic Gout.

By far the most common form of atonic gout is that of dyspepsia. In laying down the general principles, therefore, on which the treatment of atonic gout is conducted, I shall keep this form of it in view, and afterwards make a few remarks peculiarly applicable to the other appearances it assumes. This method is more distinct than endeavouring at the same time to lay down the treatment in affections so dissimilar.

a white mass, which he calls medicinal soap. If there is too much oil, the surplus floats on the surface; if too much alkali, it subsides to the bottom, so that much nicety is not required in proportioning the ingredients.

* This medicine was proposed by Dr. Le Fever, and at one time made much noise. See a pamphlet respecting it by the Rev Mr. Marshall, and another by Mr. Drake, who was also a proprietor of a gouty specific.

From what has been said the reader must perceive, that there are few who have been subject to the gout for a considerable length of time, and yet remain free from the irregular forms of it. During the intervals, even those who have not been long afflicted with the disease are constantly complaining of flatulence and other dyspeptic symptoms. But while these symptoms are moderate, alleviated by a proper attention to diet and exercise, and do not interfere with the return of the regular paroxysms, they do not deserve the name of atonic gout.

It seems at first sight surprising that the prognosis in the dyspepsia of gouty patients should differ so essentially from that in other cases of this disease. We see people of all ages and temperaments afflicted with the most severe dyspepsia, occasioning violent pain, extreme sickness, and even syncope, but still unattended with danger. Other tendencies of the gouty diathesis seem to unravel this difficulty; it exposes, we have seen, to more dangerous complaints than dyspepsia. When we reflect on the great debility which generally precedes death in gouty dyspepsia, the manner of the death, and the diseases to which the habit is disposed, there can be little doubt of its being occasioned by the affection of the brain, which has been termed nervous apoplexy. Were I to enter at large on the subject of apoplexy, we should find additional reasons for this opinion.

We have two things in view in treating the atonic gout; to remove the symptoms of debility, and to restore the regular fits. It is to be observed, that if we succeed in either of these indications, the other for the most part is answered at the same time.

Of removing the Symptoms of Debility in Atonic Gout.

For this purpose Sydenham relies more on regimen than medicines, and justly observes, that all the means we can employ will be of little avail if the patient neglects exercise. A proper attention to diet is no less necessary. What I said of these in speaking of regular gout, is applicable here.

Cold bathing has been recommended. There are two circumstances, however, which render it a doubtful practice. It is apt as it were to overpower a debilitated habit, so that on coming out of the water the patient finds himself more anxious and debilitated than before. As much as possible to prevent this, he should be careful to avoid every kind of fatigue before going into the water, to remain in it as short time as possible, and as soon as he comes out to have the whole body rubbed with dry cloths. If by these means he feels no glow of heat, or, although he feels some degree of it, if his appetite and spirits are not rendered better by the bath, there can be no doubt of the impropriety of continuing it. The other circumstance which particularly demands attention in the use of the cold bath, is its tendency

to prevent the accession of regular fits, if employed at the time they are about to appear. It is never to be recommended, therefore, if, from pains of the limbs or other circumstances, there is reason to expect a fit. Some, indeed, have been so much afraid of this effect, that they have wholly condemned the use of the cold bath in every form and period of the disease.

There is no irritation more debilitating than that occasioned by the morbid contents of the stomach and intestines, especially if, as frequently happens in the atonic gout, the bowels are at the same time too languid. The means recommended to remove this source of irritation should be of the gentlest kind, and of a warm invigorating nature. It is necessary that the body should be moderately open, but catharsis is hurtful.

It may seem, that emetics, which tend always to weaken the organs of digestion, must be hurtful in atonic gout, and that for clearing the *primæ viæ* we should trust only to gentle laxatives. This to a certain degree is just. A repetition of emetics would be hurtful, but we shall find that, besides for the purpose of clearing the stomach, an emetic is often useful. When it is judged proper, and the strength of the patient is much reduced, Dr. Musgrave recommends his drinking wine instead of water to promote its operation.

But the medicines which hold the chief place in the treatment of the atonic gout, are those termed stomachic, which consist of cordials, bitters, aromatics, and astringents. It was observed, when we were speaking of the diet during the interval, that most old arthritics require a considerable quantity of wine or other fermented liquors. When the dyspeptic symptoms amount to atonic gout, it is necessary to increase the quantity of wine. Sydenham observes, that after trying many things to remove the languor and debility of the stomach, he found nothing answer so well as a small draught of canary wine taken when these symptoms were most urgent.

But in cases which threaten immediate danger, no wine is sufficiently powerful. In that extreme pain of the stomach, under which gouty patients often expire, two glasses of strong brandy or usquebaugh, or even more, swallowed speedily, are the best medicine. In this complaint a quantity of distilled spirits or strong wine may be drank without inconvenience, which at other times would occasion intoxication. If there is any remedy more powerful, in such cases than distilled spirits, it is a large dose of opium, which often bring immediate relief.

I have seen slight pains of this kind removed by applying to the feet as much heat as they could bear, by means of warm bricks wrapped in flannel. And even in more severe cases, if had recourse to as soon as the pain comes on, this may render a smaller quantity of more pernicious remedies necessary.

It is in that form of atonic gout which appears chiefly in debility of the stomach, that the occasional use of bitters is still by many recommended ; and if they are ever proper it is in such cases where considerable advantage may be expected from a temporary use of them. "For strengthening the stomach," Dr. Cullen observes, "bitters and the Peruvian bark have been employed, but care must be taken that they be not constantly employed for any great length of time." The bark is astringent as well as bitter. Simple astringents are safer remedies in atonic gout, and some of them are very effectual. There is none so much celebrated as iron. Musgrave used the rust, which he considered a very powerful means of strengthening the stomach in gouty cases. Dr. Cullen also prefers the rust, others the tincture. With respect to aromatics, they generally enter into the compositions of cordials, and do not appear more apt to hurt the stomach than the other ingredients of such medicines, particularly the distilled spirits. It is to be recollected, that all this set of medicines is only given when necessity demands their use, not without the risque of increasing the future sufferings of the patient.

Issues are serviceable in atonic gout. They seem often in some measure to come in place of the regular paroxysm.

I may here refer to what was said of the Bath and other mineral waters in cases of gouty debility. "After all this management," says Dr. Cheyne, "should the gout still continue in the stomach and become habitual, nothing but a long course of the Bath waters, with steel bitters and gentle stomachic purges, a regular diet, and proper exercise, can effectually remove it.

When the atonic gout becomes obstinate, if there is any means of removing it, it is the change to a warm climate.

Such are the different means employed with a view more directly to strengthen the system ; it remains to point out those which tend to relieve the symptoms of atonic gout, by fixing the complaint in the extremities.

I have had occasion to mention emetics, as recommended for another purpose ; they have also been found serviceable in this way. The gout after their operation has sometimes appeared in the extremities. It is remarkable, that the very means which are most apt to drive the gout from the joints when it has already fixed itself there, and consequently occasion the atonic forms of the disease, are those which in these forms are found most powerful in inducing the regular paroxysm, namely, local applications to the feet, legs, and thighs, particularly large blisters. If the gout does not appear within a day or two after their application, some of the blistered parts should be dressed with issue ointment, which, Musgrave observes, will either bring the gout to the joints, or otherwise relieve the urgent symptoms.

With the same view a variety of rubefacients have been recommended, mustard poultices, bathing the lower extremities with hot wine or distilled spirits in which acrid substances have been dissolved, &c. Some recommended applying rubefacients previous to blisters. The reader will perceive that the use of these remedies requires some caution. If they are applied after any pains have been felt in the joints, which generally indicate a tendency in the gout to fix there, by counteracting this, they may do harm.

Walking is also a means of bringing the gout to the extremities. When the patient is unable to walk, he may go in a carriage, when even this cannot be borne, Boerhaave advises, that he should be kept warm in bed and drink some diaphoretic and aromatic liquor.

While these measures are pursued, the means of strengthening the system are not to be neglected, without which the former often prove ineffectual. Drinking a bottle of wine has been known to bring the gout to the feet, when every thing the physician could think of had failed.*

Such is the manner of treating atonic gout when it assumes the form of dyspepsia; and almost every thing that has been said will be found applicable to the other varieties of this species of gout. A very few observations on these will be sufficient.

The gouty, we have seen, are subject to diseases of the intestines as well as stomach, particularly cholic and diarrhœa. In arthritic cholic all the means just mentioned are proper, but cathartics more necessary. Fomentations of the belly,† and other measures recommended in ordinary cases of cholic are to be employed in conjunction with those which tend to fix the gout in the joints.

A similar observation applies to the gouty diarrhœa, whether bilious or not. The means we have been considering are to be combined with those employed in ordinary cases of this complaint. If it evidently arises from an accumulation of acrid matter in the intestines, it is necessary to promote the discharge of this matter by means of a cathartic and copious draughts of thin broth, before we endeavour to check the diarrhœa.

If the stomach is much loaded, an emetic will be of service, both by preventing the further introduction of irritating matter into the intestines, and tending to allay their motion. But when the diarrhœa is bilious, even although there be symptoms of bile in the stomach, emetics should be avoided. In these cases, acids,

* See Van Swieten's Commentary on Boerhaave's Aphorisms on the Gout.

† In cholic I have seen much relief obtained from flannel, dipped in brandy, and sprinkled with black pepper, applied to the belly.

particularly the vitriolic, are serviceable, by correcting the bile. When the intestines are sufficiently emptied, the diarrhœa must be allayed by astringents and opiates. Musgrave and Sydenham did not hesitate to recommend the latter, though Cheyne and others express fears of them, not however, it would seem, on sufficient grounds.

Exercise of various kinds tends at once to check the diarrhœa and bring the gout to the extremities. If exercise and laudanum fail, says Sydenham, the only remedy I know of is to bring out a sweat, both by external and internal means ; if this be done morning and night for two or three days together, and for two or three hours each time, the diarrhœa is generally checked and the gout often fixed in the joints.

When the stools assume a dysenteric appearance, strong cordials and meats are pernicious. The diet must then be mild, and the use of astringents avoided. In such cases the best plan seems to be to excite a discharge of the irritating matter, from which the dysenteric purging generally arises, by mild cathartics, particularly ipecacuanha, in small doses, and then allay the pain and irritation by small and repeated doses of opium combined with a considerable quantity of mucilage.

The treatment of gouty asthma differs from that of the common asthma only in the addition of means for bringing the gout to the extremities.

The same may be said of the treatment of syncope in gouty habits, except that the cordials should be of the most powerful kind ; they should be given by clyster during the fit, and drank freely during the intervals. There is much danger in attempting to throw any thing into the stomach while syncope lasts ; when the patient does not make the effort to swallow, it may fall into the trachea.

In gouty palsy and apoplexy the treatment differs still less from that of other cases of these complaints ; for in palsy and poplexy the means employed for bringing the gout to the extremities are necessary, although there be no gout in the habit, and consequently where there is, serve a double purpose. In many cases of palsy and apoplexy it is difficult to ascertain the propriety of having recourse to evacuations. To point out the various circumstances which here influence our judgment, would lead to too long a digression ; but this may upon the whole be observed, that evacuations should be used more sparingly in gouty than in other habits.

When the patient is afflicted with flying pains in various parts of the body, or quinsy, inflamed eyes, tooth-ach, &c. while the common means for removing these complaints are employed, as in the preceding cases, we hope for a cure chiefly by bringing

the gout to the joints. The reader will infer from what has been said, that issues are often serviceable in such cases. I have seen the best effects from them.

We are next to consider the treatment of retrocedent gout. This form of the disease is even more dangerous than the preceding, because the means of relief are generally more confined. It would appear at first sight, that as all the danger proceeds from the gout leaving the extremities and affecting some internal part, we should constantly have recourse to the means above pointed out, as tending to bring the gout to the former. But I have already had occasion to observe, that although these remedies often succeed in bringing the gout to the joints when they are wholly free from pain, yet if there be any remains of pain in them, which frequently happens, they will generally render the retrocession more complete, so that it is only when the joints are perfectly free from pain that they can be employed. In other respects the treatment of the retrocedent, resembles that of the atonic gout.

When the stomach is affected, recourse must immediately be had to the strongest cordials, strong wines, or distilled spirits, with aromatics, given warm. The medicines termed antispasmodics have been much commended in this form of the disease. Many give asafœtida, musk, and ammonia, but the medicines of this class most to be depended on are ether, and above all others, opium. If vomiting comes on, it should be encouraged by draughts of warm wine till the stomach is cleared, and then allayed by a dose of opium and camphire. When the pains of the joints suddenly receded, and were followed by oppression, sickness, and vomiting, Sydenham used to drink some diluting liquor to promote the vomiting, and afterwards take eighteen drops of laudanum in Canary wine; he then went to bed and endeavoured to compose himself to rest. By these means, he assures us, he has often been snatched almost from death.

Musgrave recommends blood-letting in the asthma of retrocedent gout when the patient is plethoric. This remedy, which has often done so much harm in ordinary cases of asthma, is still more to be dreaded here. In short, the usual means employed in asthma must be had recourse to, with this caution, that it is of still greater consequence in a gouty habit to save the strength. A similar observation applies to all the other forms of retrocedent, as well as atonic gout, diarrhœa, cholic, apoplexy, palsy, &c.

From what has already been said of the third species of irregular gout, the misplaced, it appears, that the complaints which have been known by this name are nothing more than some of the phlegmasiæ we have been considering, supervening in a gouty habit; and the only thing peculiar to their mode of treatment in such a habit, is, that evacuations must be employed with more caution.

The gout is frequently complicated with other diseases. Its fits then often become remarkably frequent and irregular, and resist attention to diet and other means found in ordinary cases to relieve it. All that can then be done is, as far as the case admits of it, to combine the modes of treatment suited to the different complaints. When they cannot be combined, the most urgent complaint demands our first attention. The presence of each will generally modify the treatment of the other, and much must be left to the discernment of the physician after he is made acquainted with all that can be said of the treatment of both.*

Such is the treatment of the various forms of gout. What has been said of it, particularly of the treatment of regular gout, sufficiently evinces the truth of Hoffman's observation, that this disease does not bear a multiplicity of remedies, and that the practitioner ought to confine himself to a few, the utility of which experience has ascertained.

* For a very peculiar kind of irregular gout, which I do not find mentioned by any author but Liger, and those who mention it from his Treatise, the reader is referred to the 369th page of his work. I have not quoted any part of this account, as it is given in a very vague manner. Liger, indeed, has scarcely treated any part of this subject with precision.

BOOK. II.

OF THE HÆMORRHAGIE.

WE are now to consider the second order of symptomatic fevers, which has been defined,

Symptomatic fever, in which the local disease is a flow of blood not arising from external injury.

In this order the diseases are so simple and resemble each other so much, both in their symptoms and mode of cure, that it is not necessary to consider them separately. There is one disease, indeed, arranged by Dr. Cullen in this order. (as a sequela of hæmoptysis) which it will be necessary particularly to consider, as it is a disease of more consequence and more complicated, both in its symptoms and mode of treatment, than the diseases with which it is arranged and indeed has nothing in common with them; namely, the phthisis pulmonalis, commonly called the consumption of the lungs.

In treating of hemorrhagy in general, I shall allude to the peculiarities of its different genera.

Dr. Cullen arranges under this order only four genera; the epistaxis, or bleeding from the nose; the hæmoptysis, or spitting of blood from the lungs; the hæmorrhoids, or discharge of blood from small tumors about the anus; and the menorrhagia, or a flow of blood from the uterus. To these most authors add the hæmatemesis, or vomiting of blood, and the hæmaturia, or bloody urine. These Dr. Cullen regards as seldom, if ever, primary diseases. Some authors have still added other genera, hemorrhagy from the gums for instance, but this is endless; we might with equal reason regard hemorrhagy from the fauces, the skin, &c. as distinct genera. These rarely occur, and when they do are generally symptomatic. The hemorrhagies I shall chiefly have in view in the following observations are the four genera of Dr. Cullen, and the hæmatemesis and hæmaturia.

CHAP. I.

Of the Symptoms of the Hæmorrhagia.

THE symptoms of the hæmorrhagia may be divided into those which precede the flow of blood, and those which accompany it.

The symptoms which precede considerable hæmorrhagy, resemble those which appear at the commencement of the phleg-

masiæ, or indeed of fevers in general. A cold fit comes on, the skin being constricted and the extremities cold, with weariness of the limbs, pains of the back and head, costiveness, flatulence, and other febrile symptoms ; and the hot fit, in which the pulse is frequent and full, and in many cases hard, is often formed before the blood appears.

These symptoms are generally most remarkable before internal hemorrhagy. They are very generally attended with a train of local symptoms, affecting the parts from which the blood is about to flow.

In external parts we can often observe some degree of redness and swelling, and whether the part be external or internal the patient often complains of a sense of heat, fullness, and tension, sometimes of weight and pains of different kinds in it and the parts about it. But the local symptoms preceding hemorrhagies, are very various, and differ according to the situation, nature, and office of the diseased part.

Before the appearance of epistaxis, we often observe all the symptoms occasioned by an unusual determination of blood to the head, strong beating of the arteries of the head and neck, flushing and swelling of the face, &c. The whole head, Hoffman observes, is sometimes much swelled, the nostrils being hot and dry.

Hæmoptysis is preceded by affections of the thorax. The patient often complains of a sense of weight, anxiety, and pains about the breast, with some degree of dyspnœa, often of a sense of heat, sometimes under the sternum, sometimes moving from place to place, and a little before the blood appears there is frequently a saltish taste in the mouth. At length a tickling at the top of the larynx, now and then extending itself along the trachea, occasions hawking, which brings up a little blood of a florid colour and more or less frothy. As the quantity of blood increases, there is a rattling noise in the wind-pipe before it is brought up, and then it comes less by hawking than by coughing, which is sometimes the case from the first.

When blood is spit, it sometimes requires attention to determine whether it comes from the lungs, stomach, or fauces. But the manner in which it comes generally indicates from what part the blood flows. If from the stomach, it is vomited, not coughed ; if from the fauces or nose, it is often brought up without either hawking or coughing ; or if from its falling upon and irritating the glottis, some degree of these takes place, the history of the case and other symptoms will generally point out its source. The blood from the stomach and fauces is generally of a dark colour, and unmixed with globules of air.*

* See the 841st and following paragraphs of Dr. Cullen's First Lines:
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In the hæmorrhoids the blood is seldom, perhaps never, discharged till small tumors are formed about the anus, either externally or on the inner coats of the intestine a short way above the anus. These tumors are more or less distinct. Sometimes there appears a general tumefaction of the anus. The tumors are termed hemorrhoides, (piles); they sometimes continue to tease the patient without discharging blood, and are then termed the blind piles. hemorrhoides cæcæ. But the production of these swellings, whether external or internal, is generally preceded by a variety of symptoms. They often leave the patient, and in a short time again make their appearance, sometimes continuing to come and go at nearly equal periods. Every time they appear, they are for the most part preceded by a similar train of symptoms.

Before the appearance of piles, the febrile symptoms are more frequently well marked than in either of the preceding hemorrhagies. The mouth and fauces in particular are dry, the skin constricted, and the urine at once pale and in small quantity. The local symptoms too are more numerous and varied. Vertigo, head-ach, stupor, sickness, and other symptoms of dyspepsia, often precede the appearance of piles; and not unfrequently there is a fulness of the chest, with some degree of dyspnœa, often increased by flatulency of the bowels, which now and then are affected with colic pains. There is also pain or a sense of weight and oppression in the back and loins, and the limbs are sometimes affected with a degree of numbness. Along with these symptoms there is pain about the anus, with heat and itching, and often a sense of weight extending to the perineum, accompanied with a frequent desire to empty the rectum and bladder. The stools are sometimes bilious, sometimes mucous, and many, particularly old people, are subject to a prolapsus ani; but these last symptoms are rather to be regarded as causes, than merely preceding symptoms of the piles.

The degree of the foregoing symptoms is very various in different cases, generally proportioned to the degree of piles which is to succeed.

A serous discharge from the anus, accompanied with some degree of swelling, now and then precedes the piles, and sometimes comes in place of them and the bleeding, relieving the foregoing symptoms in the same manner as the flow of blood does. This complaint has been called the hemorrhoids a ba.

The symptoms preceding the menorrhagia are similar to those which precede the hæmorrhoids. As the menstrual discharge is more or less irregular, that is, flows in greater quantity and longer at one time than another in most women, who notwithstanding enjoy a good state of health, every little excess is not to be regarded as a case of menorrhagia. It is only when the discharge is such as to debilitate that it is to be regarded as a disease.

The hæmatemesis, or vomiting of blood, is preceded by affections of the stomach and parts in its neighbourhood. There is often pain and tension of the left hypochondrium and much anxiety, with a sense of tightness in the chest.

Bloody urine is frequently not preceded by any remarkable symptom when it is independent of calculous affections. Sometimes pains of the back and considerable uneasiness in the region of the kidney denote its approach.

Such are the symptoms preceding hemorrhagies. All of them however, especially when they are about to be inconsiderable, occasionally make their appearance without any preceding symptom. The local symptoms most uniformly precede hemorrhagies.

There is a species of hemorrhagy termed by nosologists passive, which is never preceded by symptoms of fever that is, by any symptomatic of the hemorrhagy. This species Dr. Cullen has properly arranged among the Locales. It either originates from external violence, or is a symptom of diseases of debility, scurvy, typhus, &c. There is nothing to be said of the symptoms of such hemorrhagies, and their mode of treatment will sufficiently appear from what will be said of active hemorrhagies. These, indeed, when the flow of blood induces a great degree of debility, may be said to be changed into passive hemorrhagies.

We are now to consider the symptoms which attend the flow of blood. On this part of the subject a very few words will be sufficient. When the fever has been considerable, it generally continues till the blood ceases, or nearly ceases, to flow. The same may be said of the local symptoms, although in general there is an abatement of both soon after the blood appears, especially if it flows freely. There is no hemorrhagy perhaps which so constantly relieves the symptoms which precede it, as the epistaxis.

When the loss of blood is great, every part of the body, particularly the face, becomes pale; the patient complains of giddiness and other symptoms of approaching syncope; the pulse becomes weak, and if the hemorrhagy proves obstinate and profuse, ceases altogether, complete syncope coming on. Previous to death, however, the patient falls into convulsions, which may be regarded as the last stage of fatal hemorrhagies.

The quantity of blood lost is various, from that of a few drops to many quarts; nor is the duration of the complaint less various, from that of a few minutes to weeks or even months. The quantity of blood which may upon the whole be lost, it is evident must depend much on the duration of the hemorrhagy. The blood assumes different appearances, according to the part from

which it flows, the time which it has remained in any of the cavities, and the age and habit of the patient. Blood from the lungs is generally more florid than that effused from parts at a distance from this organ. If blood has lain for some time in any of the cavities, the bladder, rectum, uterus, &c. it assumes a very dark colour and often forms clots sometimes of so firm a consistence as to resemble flesh. If the patient be young, the blood appears of a loose consistence and full of globules. In middle age, the globules are less numerous and the blood of a more adhesive consistence. In old age it is more thin and watery. In dropsical habits it is also found in this state; and in those labouring under diseases of great general debility, thin and sanious.

When the blood begins to flow, if the patient has been well previous to the attack of the disease, it appears in the healthy state, except that it is generally covered with the buffy coat, as in the phlegmasiæ, but becomes thinner as it continues to flow.

The diagnosis of hemorrhagies is sufficiently evident; on the prognosis it will be necessary to make a few observations. In habits much reduced by previous disease or other causes, particularly in those which shew a tendency to dropsy, even a moderate loss of blood may prove dangerous. In advanced age hemorrhagies are more to be feared than in youth and the vigour of life.

But whatever be the habit or age of the patient, if the blood flows profusely, if the lips, nails, and other parts become pale, if the extremities become cold, and the patient fall into syncope, especially if there be any convulsions of the limbs, the danger is very great.

It is not to be overlooked, however, that syncope is often a means of checking hemorrhagies, for as the vis a tergo tending to propel the blood from the vessels is interrupted, or nearly so, in syncope, the blood generally ceases to flow, and during this time the bleeding vessels are often closed, partly by their own contraction and partly by the blood coagulating in them, so that the feeble vis a tergo after recovery from syncope is often insufficient to overcome these obstacles, and thus for the present the hemorrhagy is removed.

The danger in hemorrhagies, however, is not always proportioned to the loss of blood, as they often indicate the approach or presence of other diseases. Few complaints are less to be dreaded than epistaxis in children; but old people subject to it are in danger of apoplexy. Although the loss of blood by hæmoptysis be very inconsiderable, it is an alarming complaint, because it indicates a tendency to phthisis.

The appearance of the blood in hæmorrhagies assists the prog-

nosis. The firmer its consistence, the greater the proportion of red globules, and the less considerable the buffy coat, the less is the danger. The danger is great when the blood becomes watery, and still greater if it assumes a sanious appearance. When we come to speak of the causes of hemorrhagy, we shall find that an attention to them also is necessary in collecting the prognosis. I have already had occasion to observe, that hemorrhagies are apt to return periodically, the prognosis therefore is collected not only from the symptoms while the hemorrhagy is present, but from the state of the patient also during the interval. If he enjoys his usual health, has a good appetite, and does not lose flesh, there is little to be apprehended. But if he is low spirited and indolent, if the appetite fails, and the countenance becomes pale and emaciated, particularly if symptoms of dropsy appear, the danger is very great, unless the return of the hemorrhagy can be prevented.

CHAP. II.

Of the Causes of the Hæmorrhagiæ.

THE remote causes of hemorrhagy, like those of the phlegmasiæ, are very simple. Those of a sanguine habit, slender make, and delicate constitution, are most subject to hemorrhagy. The robust and laborious are least subject to it, that is, those whose vascular system is most delicate are, as we might a priori have supposed, most subject to ruptures in it. It is also observed, that the places from which hemorrhagies most frequently happen, are those in which the blood-vessels are most numerous, the internal membrane of the nose, the lungs, &c.

Why different ages predispose to different hemorrhagies, it is more difficult to explain. Epistaxis is most common in children; hæmoptysis from puberty to between thirty and forty; hæmorrhoids from this period to about sixty; and hemorrhagy from the kidneys and the brain in advanced old age. There is no period of life, however, at which any of the hemorrhagies may not occur.*

When the reader is made acquainted with the occasional causes of hemorrhagy, it will be less difficult to conceive why the changeable weather of autumn and spring should be more favourable to their production, than the more equal temperature of summer and winter.

* Various hypotheses have been advanced to explain the tendency of different times of life to different hemorrhagies, but as they are in general very unsatisfactory, I shall not detain the reader with any account of them.

There are, perhaps, no diseases which leave behind them so strong a predisposition to future attacks as hemorrhagies, which seems partly to arise from the ruptured vessels and those in their neighbourhood, in consequence of the distention they have suffered being left in a state of debility, which occasions a determination of blood to the part, and partly from loss of blood, as I have more than once had occasion to observe, disposing to plethora, the powers of assimilation seeming constantly to prepare a quantity of blood proportioned to the demand for it.

Of all the predisposing causes of hemorrhagies, plethora is the most frequent ; all the causes of which consequently may be regarded as predisposing causes of these diseases.

Almost all the foregoing causes act occasionally as exciting causes.

It is a common observation, that those hemorrhagies which are caused by mere plethora, are of all hemorrhagies proceeding from internal causes most easily removed, and most frequently cease spontaneously ; an observation which might have been made, *a priori*, since in this instance the disease necessarily removes its cause.

In active hemorrhagy there seems always to be a rupture of one or more small vessels. It has been supposed, indeed that an increased force of circulation may so dilate the excreting vessels as to occasion an effusion of blood independently of rupture. This, however, appears extremely improbable, especially when we consider that an increased force of circulation tends to invigorate, not to relax. Such an effusion, indeed, seems frequently to happen in passive hemorrhagies, particularly those which appear in diseases of extreme debility, and which seem to be merely the consequence of extreme relaxation of the vessels and tenuity of the blood. The remote causes of active hemorrhagy are all such as tend to occasion a rupture of the vessels. They all occasion a turgescence in the part from which the blood is about to flow. If the vessels yield without being ruptured, inflammation takes place. Hence some degree of inflammation always precedes active hemorrhagy. When a rupture happens in any of the vessels of the part, the whole are relieved. Thus in epistaxis, the preceding fullness and redness are often equal in both nostrils. It rarely happens, however, that an hemorrhagy from both takes place at the same time ; the first vessel which gives way in either nostril relieves the turgescence of both.

Dr. Cullen enumerates seven occasional causes of hemorrhagy ; namely, external heat ; a considerable and sudden diminution of the weight of the atmosphere ; whatever increases the force of the circulation ; violent exercise of particular parts of the body ; certain postures of the body or ligatures ; a particular state

of certain vessels from the frequent repetition of hemorrhagy ; and lastly, cold externally applied.

On comparing these causes of hemorrhagy with what has been said, the manner in which they act will be sufficiently obvious, with the exception of cold, whose operation it is more difficult to trace. It seems to be chiefly by exciting some degree of synocha, that cold occasions hemorrhagy, that is, by increasing the vis a tergo, which probably in a great measure proceeds from its debilitating the vessels of the skin.

Such are the causes of hemorrhagy in general. Certain hemorrhagies proceed from other causes, particularly affecting the part from which the blood flows. An ulcer in the kidneys, ureters, bladder, stomach, intestines, &c. is not an uncommon cause of hemorrhagy. The contents of these cavities being of an irritating quality, or occasioning too great a degree of distention, often has the same effect. The last cause is frequently the means of renewing hemorrhagy of the stomach and intestines, in preventing which it is necessary to caution the patient against too much repletion, particularly against taking copious draughts. Sudden repletion probably acts also by compressing the liver, thus tending to obstruct the circulation through it and consequently oppose an obstacle to the free return of the blood from the intestines. I know a person in whom a copious draught will at any time induce hemorrhagy from the intestines. A malconfirmation of the thorax very frequently proves a predisposing cause of hæmoptysis, and when to a considerable degree an exciting cause. The same may be said of pressure from affections of neighbouring viscera, &c. as in hæmoptysis from schirrous liver, &c.

CHAP. III.

Of the Treatment of the Hæmorrhagiæ.

MANY seem to have regarded all spontaneous hemorrhagies as proceeding from a plethoric state of the system, and have maintained that no remedy should be employed to check an hemorrhagy, unless it is so profuse as to be attended with immediate danger. In these positions, however, many important circumstances are overlooked. "In entering upon this subject," says Dr. Cullen, "the first question which presents itself is, whether the cure of hemorrhagies ought to be attempted by art, or if they should be left to the conduct of nature. The latter opinion was the favourite doctrine of the celebrated Dr. Stahl and his followers. They maintained that the human body is much disposed to a plethoric state, and consequently

" to many disorders which nature endeavours to obviate and re-
 " lieve by exciting hemorrhagy. That this therefore is of en ne-
 " cessary to the balance or health of the system. That it is ac-
 " cordingly to be generally encouraged, sometimes solicited,
 " and is not to be suppressed unless when it goes to great excess,
 " or happens in parts in which it may be dangerous. Much of
 " this doctrine may be admitted. The human body upon many
 " occasions becomes preternaturally plethoric, and the dangerous
 " consequences which might from thence be apprehended seem
 " to be obviated by a hemorrhagy taking place ; and the neces-
 " sity of hemorrhagy further appears from hence, that the sup-
 " pression of it seems to occasion many disorders. All this
 " seems to be just, but in the conclusion drawn from it there is a
 " fallacy. It appears to me certain, that hemorrhagy, either upon
 " its first attack, or upon its after occurrence, is never necessary
 " to the health of the body, excepting upon the supposition that
 " the plethoric state, which seems to require the evacuation, can-
 " not be otherwise prevented or removed ; and as I imagine it
 " possible by other means to prevent or remove a plethoric state,
 " so I do not think that hemorrhagy is in all cases necessary. In
 " general I am of opinion the hemorrhagy is to be avoided ; first,
 " because it does not always happen in parts where it is safe ; se-
 " condly, because often while it does relieve a plethoric state, it
 " may at the same time induce a very dangerous disease ; thirdly,
 " because it may often go to excess, and either endanger life or
 " induce a dangerous infirmity ; and, lastly, because it has a ten-
 " dency to increase the plethoric state it was meant to relieve to
 " occasion its own recurrence, and thereby to induce a habit,
 " which, if left to the precarious and unequal operation of nature,
 " may from the frequent errors of this be attended with much
 " danger. It is further to be considered that hemorrhagies do
 " not always arise from the necessities of the system, but often
 " proceed from incidental causes. It appears to me that all he-
 " morrhagies of the latter kind may be immediately suppressed,
 " and the repetition of them, as it induces a plethora and a habit
 " not otherwise necessary, may be prevented with great advan-
 " tage. Upon the whole of this subject I conclude, that every
 " preternatural hemorrhagy, or, in other words, every one ex-
 " cept that of the menses in females, is to be avoided, and espe-
 " cially the returns of it prevented." To these observations no-
 " thing need be added.

The means employed in hemorrhagy may be divided into those
 which moderate or check the flow of blood, and those which pre-
 vent its return.

The means of moderating or checking hemorrhagy may be di-
 vided into those which act on the system in general, or on parts
 at a distance from that from which the blood flows, and those
 whose action is confined to that part.—From what has been said

of active hemorrhagy, the reader will perceive that the flow of blood is often supported by the febrile state which attends it, in which the blood is propelled with more than its usual force. A principal indication in active hemorrhagy, therefore, is to diminish excitement, and the different means pointed out for this purpose must occasionally be had recourse to. Those which constitute what has been called the antiphlogistic regimen, and consist in the removal of every cause of irritation, are in all cases essential. The patient must be kept quiet and still, every exertion, either of mind or body proving hurtful. The regular excretion of the fæces is particularly to be attended to, and the means employed for this purpose must be of that kind which occasion least irritation.

Unless the strength be greatly exhausted, in which case mild broths and some of the mildest kinds of animal food may be used, the patient should be confined to a vegetable diet. There is nothing of greater importance than a constant supply of cool fresh air, and the drink should be cold. The use of acidulous fruit, cream of tartar, nitre, vegetable acids, or what is preferable on account of its astringency, vitriolic acid, in the drink is beneficial. All refrigerants are useful in active hemorrhagy.

Even the most powerful means of allaying excitement, blood-letting, which at first sight we should suppose at all times improper, is sometimes advisable. "I am ready to allow," Dr. Cullen observes, "that the practice of blood-letting in hemorrhagies has been often superfluous, and sometimes hurtful, by making a greater evacuation than was necessary or safe. At the same time I apprehend it is not for the mere purpose of evacuating, that blood-letting is to be practised in the cure of hemorrhagy, but that it is farther necessary for taking off the inflammatory diathesis which prevails, and the febrile spasm that has been formed. Accordingly, in the case of hemorrhagy, when the pulse is not only frequent but hard and full, and does not become softer or slower on the flowing of the blood, and when the effusion is profuse, or threatens to become so, it appears to me that blood-letting may be necessary, and I have often found it useful. It seems probable also, that the particular circumstances of venesection may render it more powerful for taking off the tension and inflammatory irritation, than any gradual flow from an artery." Blood-letting may often be employed with advantage, even where the discharge of blood is considerable, if the febrile symptoms run high, especially if the hemorrhagy be from a part where a wound is dangerous. Blood-letting is often proper also for the purpose of removing the symptoms which precede hemorrhagy, when they are considerable; not only because, by relieving these symptoms, it may sometimes prevent a greater loss of blood, but because, in habitual hemorr-

hagy, it is often of consequence to break the habit, which occasions a constant determination of blood to the part.

Burserius and others have recommended blood to be taken during hemorrhagy from the parts in the neighbourhood of that from which the blood flows. The hemorrhagy itself, however, seems to serve all the purposes of local blood-letting. Dry cupping has with more propriety been employed. Local blood-letting may be employed with advantage, as a means of removing the local symptoms which precede hemorrhagy. Blisters are used with the same view.

When the local symptoms, indicating a tendency to hemorrhagy, shew themselves, blisters and local blood-letting are employed for the same purpose as in inflammation; and should, as in the latter case, and for the same reasons, be recommended along with general blood-letting when the *vis a tergo* is great, and, instead of it, when the habit is debilitated, or the affection of the system inconsiderable. The state of the part previous to the flow of blood, as was observed in the introduction to this part, is in fact that of inflammation. When both blisters and blood-letting, whether local or general, are judged proper, the blood-letting ought always to precede the blisters.

Blisters have been recommended with a view to moderate the fever which attends hemorrhagies, without regard to the local affection. I have more than once had occasion to observe, that blisters have little, if any, power to allay fever, except by relieving some local affection which supports it; and if they are not so applied as to have this effect, particularly at an early period of hemorrhagy, by increasing the impetus of the blood, they may do harm.

There is some difference of opinion respecting the employment of cathartics in hemorrhagy. With regard to the employment of drastic or irritating cathartics, there cannot be two opinions; but many practitioners have maintained that the exhibition of mild cathartics, so as to keep up a degree of diarrhœa, is useful, on the supposition that hemorrhagy often proceeds from tenuity of blood, which they endeavour to obviate by drawing off the serous part. As far as respects active hemorrhagies, this opinion seems to be false. From the several causes of active hemorrhagy which have been mentioned, the reader will perceive that there is no reason for such a supposition, and in very exhausted habits, where the hemorrhagy is more of the passive kind, and its cause may in part at least be morbid tenuity of the blood, to endeavour to relieve the hemorrhagy, by inducing another evacuation, is at least a very precarious practice. The same observation applies to cases in which active hemorrhagy continues till it exhausts the strength, and renders the blood thinner than it ought to be. Upon the whole it would seem, that to prevent any

accumulation of fæces is the chief, if not only, purpose for which laxatives should be employed in hemorrhagy.

The same ideas which led to the use of cathartics, induced physicians to prescribe diaphoretics in these complaints. They had still in view to carry off the thinner parts of the blood. This class of medicines, although the theory which first led to their use has fallen into neglect, is employed with advantage for the purpose of relieving the febrile state which precedes and supports active hemorrhagy.

The older practitioners recommended a great variety of medicines for the purpose of promoting perspiration; acids, anodynes, diascordium, milfoil, veronica, nitre, camphire, &c. Antimony, mercury, and saline preparations, are the diaphoretics which seem to be best suited to active hemorrhagy, especially where the pulse is very strong and hard, and the nausea occasioned by the first is often useful here as in inflammation, by diminishing the vis a tergo.

The observations made when we were speaking of the phlegmasiæ, respecting the digitalis, and other medicines which act in the same way, are applicable here.

The reader will find opiates very generally recommended in hemorrhagy. An indiscriminate use of them he will readily perceive, from what has been said, is dangerous. They are improper while much of the phlogistic diathesis remains, and the pulse continues full and strong. After this state has been overcome by proper remedies, or the continuance of the disease, opiates tend to check the flow of blood. They are particularly indicated with musk and castor when subsultus tendinum or other spasmodic affections supervene.

A variety of astringent medicines are given internally, for the purpose of constricting the vessels, and thus checking the hemorrhagy. The vitriolic acid, I have already had occasion to mention; allum, in which it is combined with an earth, is more powerful. Lead, iron, oak galls, bark, &c. have been recommended. If any of these is more powerful than allum, it is lead, the acetate of which has been much praised. It is almost unnecessary to caution against the long continued use of this medicine, even in small doses. Where it is of great importance to check the hemorrhagy, it may occasionally be exhibited with advantage. It should be given in combination with mucilage, or, what is better, some tenacious extract, as far as possible to obviate its effects on the stomach and bowels.

The bark and steel are chiefly indicated when the strength, from the continuance of the disease or other causes, being greatly exhausted, the complaint partakes more of the passive than active hemorrhagy.

The older practitioners employed various means in this complaint, with a view to form some degree of congestion in parts at a distance from that from which the blood flows; warm clysters, fomentations, baths, (which were often composed of warm wine and other irritating ingredients) frictions, ligatures thrown round the limbs, &c. And at the same time that these were employed, refrigerant applications were made to the parts in the neighbourhood of those from which the blood flowed. It is evident that most of the remedies just mentioned (all the most powerful of them) are of an irritating nature, and therefore of doubtful effect while much of the inflammatory diathesis prevails.

I have already had occasion to observe, that syncope is often serviceable in checking hemorrhagy; it is improper, therefore, to use means to prevent it. All kinds of cordials are on this account to be avoided. Strong odours, and every other means of rousing the patient, are improper; and if from the situation of the part, some degree of the erect posture has been judged proper, the patient should not be laid in the horizontal posture with a view to prevent syncope. These observations, however, do not apply when the hemorrhagy has become passive. Syncope is then attended with great danger, and must be prevented by the usual means.

Many superstitious remedies have been employed, and by the impression made on the mind have sometimes proved serviceable.

Such are the remedies acting on the system in general, or on parts at a distance from that from which the blood flows. We are now to consider those whose action is confined to that part, and which seem to act by occasioning a contraction of the bleeding vessels.

The various astringents just mentioned are employed for this purpose, particularly allum and the acetate of lead. The sulphate of zinc is among the most powerful. The reader will find many astringent applications enumerated by the authors who treat of hemorrhagy. Dr Cullen observes, that the most powerful of all astringents in hemorrhagy, appears to him to be cold. It is useful we have just seen, applied generally by an atmosphere of a low temperature. When it is applied to the part, it is of advantage to apply it suddenly, and at the same time to parts in the neighbourhood.

Pressure is a powerful means of checking hemorrhagy, when it can be applied to the bleeding vessels; and in obstinate hemorrhagy it is proper, where it can be done, to secure the larger vessels by ligature.

With regard to the means by which the disposition to hemorr-

hagy is counteracted, a few observations, in addition to what has been said of its causes, will be sufficient.

A plethoric state of the system, we have seen, is one of the most common of these causes ; and this state has almost always either been the original cause of the disease, or has been induced by it. This, therefore, is the habit of body, which we are to correct during the intervals.

The means of correcting plethora I have more than once had occasion to mention.*

We have two things chiefly in view, to diminish the ingesta, and increase the excreta.

It is difficult to resist the appetite for food, so that it is generally proper to recommend such as affords comparatively a small quantity of nourishment. Vegetable food is best calculated to lessen plethora, but it is necessary, in recommending it, to pay some attention to the patient's habits. The same may be said of substituting water for more nourishing and stimulating fluids.

The best and most effectual way of increasing the excreta, is exercise. Cold bathing and tonic medicines, by increasing the tone of the vessels, tend to prevent plethora, and are doubly indicated when the loss of blood has occasioned much debility.

Those tonics, however, which increase much the force of the circulation, particularly bark and steel, are doubtful remedies, as they may be the means of renewing the hemorrhagy. Mild aromatics and bitters are safer. But the most effectual of this class of remedies, are astringents, which shew little or no tendency to increase the force of the circulation, particularly allum and the vitriolic acid. Bark and steel during the interval, as during the hemorrhagy, are particularly indicated when it is of the passive kind.

When the hemorrhagy has left much debility, it is often necessary to use a more nourishing diet. We are still, however, to choose that which is least irritating. The flesh of young animals is to be preferred to that of old ; and wine, if used at all, should be diluted. And although a pretty full diet may be necessary for some time after the hemorrhagy, yet, as soon as the strength is restored, it should be our view to bring the patient to that mode of life which is best calculated to prevent plethora, still, however, with some regard to that he has been accustomed to.

* See Dr. Cullen's First Lines from the 782d to the 788th paragraph.

CHAP. IV.

Of the Phthisis Pulmonalis.

THERE is no complaint arranged under the order of hæmorrhagy of so much importance as the Phthisis Pulmonalis, which Dr. Cullen ranks as a sequela of hæmoptysis. It will be necessary to consider it at some length. Dr. Cullen defines this disease,

General emaciation and debility, with cough, hectic fever, and, for the most part, a purulent expectoration.

If we except the last of these symptoms, which in a large proportion of phthysical cases, never appears, this definition will be found to apply to glandular affections of the abdomen, as well as to phthisis ; and for the purpose of distinguishing the two cases, the former of which I have often seen mistaken for the latter, it may be proper to add to the foregoing definition, without any tension or tenderness of the abdomen. It is true, indeed, that the greater severity of the cough will often serve to distinguish phthysical cases ; in these, however, the cough is sometimes slight, and has even, it is said, been wholly absent.* I have already had occasion to mention the leading symptoms of hectic fever.

Dr. Cullen divides phthisis into two varieties, the phthisis incipiens without purulent expectoration, and phthisis confirmata with purulent expectoration. Although in most cases of phthisis there is no purulent expectoration for some time after the commencement, it now and then attends from the beginning, as shall be more particularly pointed out hereafter. And in some cases, I have just had occasion to observe, it never appears at all, the reason of which will be evident when we come to speak of the causes of phthisis. I shall not therefore follow Dr. Cullen in this division, nor, indeed, does it seem to serve any purpose.

SECT. I.

Of the Symptoms of Phthisis Pulmonalis.

PHTHISIS often makes its attack with very deceitful appearances, so that the patient is scarcely aware of his danger before the case is desperate. The first symptom is frequently a slight cough, occasioned, the patient supposes, not by any complaint of

* See Lieutaud's Synopsis Med. Pract.

the lungs, where he feels no uneasiness. but by an uneasy sensation about the larynx, which is readily ascribed to cold. At an early period there is either no fever, or it is slight and rather irregular, and very different from hectic fever. The cough is either dry, or a little mucus is expectorated, as in common catarrh. These symptoms give little trouble, and are expected to go off as they have frequently done before without any remedy. Notwithstanding their mildness, however, they prove obstinate, and gradually become more troublesome. They are sometimes from the first accompanied with pains of the chest, either wandering like stitches, or more obtuse, and fixed under the sternum, or in the sides of the thorax. In other cases the pain does not come on till the other symptoms have lasted for some time.

In many cases the complaint shews itself in a more alarming form, hæmoptysis being the first symptom, which is often, indeed, rather the cause than a part of the complaint. By degrees the expectorated matter begins to assume the appearance of pus, and the febrile symptoms that of hectic. "I have met with some instances," Dr. Cullen observes, "of an expectoration of purulent matter continuing for many years, accompanied with very few symptoms of hectic, and at least without any hectic exquisitely formed, but in none of these instances were the persons so entirely free of hectic as to form any exception to the general definition."

Hectic fever is a quotidian remittent, the chief, and sometimes the only, exacerbation of which commences about five o'clock in the afternoon, often with slight chills, which generally continue for some time after the skin, to the feeling of another person, or measured by the thermometer, is warmer than natural. This exacerbation goes on increasing till after midnight, the pulse being seldom under 110. and often above it. About two o'clock in the morning a sweat appears, which relieves the febrile symptoms; and as the morning advances, the remission becomes more distinct, affording the patient, who is scarcely ever persuaded that his case is desperate, an ill-founded hope of recovery. This remission frequently continues till about five o'clock in the afternoon, when the exacerbation again commences. In other cases there is another exacerbation about noon. "It has commonly been given as a part of the character of hectic fever," Dr. Cullen observes "that an exacerbation of it commonly appears after the taking food; and it is true that dinner, which is taken at noon or after it, does seem to occasion an exacerbation. But this must not make us judge the mid-day exacerbation to be the effect of eating only, for I have often observed it to come on an hour before noon, and often some hours before dinner, which in this country at present is not taken till sometime after noon. It is, indeed, to be observed, that in almost every person the taking food occasions some degree of fever; but I am persuaded

“this would not appear so considerable in a hectic, were it not
 “that an exacerbation of fever is present from another cause, and
 “accordingly the taking food in a morning has hardly any sensi-
 “ble effect.”

The urine in hectic is high coloured, and deposits a copious light branny sediment. The bowels are constipated. The thirst, however, is not considerable, and the appetite continues good. The countenance is pale, with a circumscribed redness on the cheeks, which is most remarkable during the exacerbations, and the body generally wastes rapidly.

While these symptoms advance, various marks of debility shew themselves. The hair falls off, the nails are incurvated, the feet become œdematous; in women the menstrual discharge ceases, and at length a colliquative diarrhœa comes on, which may be regarded as the forerunner of death.

There is seldom much head-ach at any period of the disease, and delirium, except towards the fatal termination, hardly ever appears; for the most part indeed, the senses are retained to the last, and, what is more surprising, the spirits and even the appetite. It has been observed, indeed, that the appetite is often better than usual a few days before death.

Such is the general course of the disease; it will be necessary to consider its symptoms more particularly.

The cough at the commencement, I have just had occasion to observe, is generally dry, and sometimes it continues so during the whole course of the disease. In most cases, however, it becomes moist, and the matter expectorated is various. In the beginning it is generally mucous, frequently bloody, and as the disease advances gradually assumes a purulent appearance.

Much has been said of the means of distinguishing an expectoration of pus from that of mucus, which cannot with certainty be done by the eye. For this part of the subject I refer to what was said in the introduction to the second part, where it is considered at length.

When the cough is violent, particularly in the advanced state of the disease and after meals, it is often accompanied with reaching and vomiting, which has been regarded by Morton and others as a diagnostic mark of the phthisical cough. This, however, is far from being constant, and vomiting frequently accompanies violent coughing from whatever cause. Exposure to cold, drinking cold liquors, the horizontal posture, and every thing which tends to hurry the breathing, are apt to excite the cough. It is generally worst in the evening, during the night, and on awaking from sleep of some continuance. Sometimes it is short and hard, at other times full and soft. The fits of coughing often

continue for some time, and either cease spontaneously, or are relieved by a more or less free expectoration.

Some have thought that they can distinguish a consumptive cough from a catarrhal, merely by the sound, and in the advanced state of the disease it has a peculiar hoarse hollow sound, which is very remarkable though not wholly confined to phthisis. At early periods the sound of the cough assists but little in forming the diagnosis. The short hollow cough, supposed characteristic of phthisis, is not always very distinctly marked, and often attends other diseases. A cough can only with certainty be pronounced phthisical, by attending to the circumstances which accompany it, particularly to the state of the febrile symptoms and the nature of the matter expectorated.

There has been some difference of opinion among medical writers, concerning the inference to be drawn from purulent expectoration. It has been the general opinion that it always indicates an ulcer of the lungs. It appears, however, from what was said in the introduction just referred to, that pus may be formed without ulceration; and some have asserted that by examining the purulent sputa we may determine whether they proceed from an ulcer or not. "In every instance of an expectoration of pus," Dr. Cullen observes, "I presume there is an ulceration of the lungs. The late Mr. De Haen is the only author that I know of who has advanced another opinion, and has supposed that pus may be formed in the blood vessels, and be from thence poured into the bronchiæ." The reader will readily perceive the fallacy of this explanation, but the fact has been confirmed by other writers, whom Dr. Cullen overlooked. In the 28th section of the 22d Ep. of Morgagni de Sedibus et Causis Morborum, there is a case related, which seems to be of the same kind with that mentioned by De Haen. To this Burserius refers, and also to Bennet's *Tabidorum Theatrum*, Lieutaud's *Historia Anatomica Medica*, and the first volume of the *Collectio Obs. Med. Pract.* by Fred. Casimirus, for similar cases.*

It is true, indeed, that a charge brought against De Haen, that he did not with sufficient accuracy determine the expectoration to be purulent, may be urged against all of these cases. When we compare them, however, with later observations, there can be little doubt of the accuracy of the statement of these authors. We have seen how readily pus is formed by secreting surfaces. Dr. Hunter relates a case of empyema, where there was no ulceration. Pus is often discharged in gonorrhœa without ulceration. I have seen it discharged from the nose, where there was no reason to suspect any; even in common catarrh the expectoration is often purulent. And that causes may exist capable of

* See also a Treatise, in Schroeder's works, on the Production of Pus without Ulceration.

supporting a purulent discharge from the bronchiæ, and inducing the other symptoms of phthisis, without ulceration, will be rendered more probable from what I shall have occasion to say respecting the causes of this complaint.

If phthisis without ulceration exists, it would be of no small consequence to be able with certainty to distinguish such cases. Where there is no ulcer, the chance of recovery must be better, and it is not improbable that the modes of practice should in some measure be different.

The diagnosis offered by the late Dr. White, published in 1792 by Dr. Hunter, of York, will not, I fear, be found sufficient for this purpose. He terms the pus produced by inflammation without ulceration, inflammatory exudation. This he observes, does not ferment or become putrid per se. A quantity of it, kept by way of experiment, after some time became dry and tough, smelling sour and faintish. This species of matter, he observes in another place, in its natural state, appears to be a homogeneous, smooth, yellowish fluid, resembling good cream, without smell, and rather sweetish to the taste, it swims in water, and when burnt smells like burnt cheese. The matter of suppuration, he thinks, is a compound, consisting of inflammatory exudation and a portion of putrid blood and solids, varying in its appearance according to the predominance of the one or other of its component parts. The greater the proportion of the putrid ichor, the more fetid, brown, sanious, and putrid it will be. The contrary condition will make it more like laudable pus, yellower or whiter, more unctuous and homogenous, and less putrid. This kind of sputa, like the other, according to Dr. White, swims in water, but has an offensive smell, except when the proportion of putrid ichor is very small, and even then if it be burnt its putrescency becomes manifest.

Dr. Stark also proposes an experiment for determining whether or not the matter expectorated in phthisis comes from an ulcer. As the spitting, he observes, is perhaps the most certain criterion of vomica, it will be proper to enquire into its peculiar character, that it may be distinguished from pus and mucus, two substances which it greatly resembles. All of them, when free from air bubbles, sink in water.* Pus is easily diffusible in it, by gentle agitation, but in a few hours falls to the bottom. Mucus cannot be diffused in water without strong agitation, but when diffused forms with it a permanent ropy fluid. The spitting of consumptive patients is more easily diffusible in water than mucus, and, like that, forms with it a ropy fluid, which although it deposits a sediment like pus, still continues ropy, resembling mucus and water. All that this experiment tends to prove is,

* When the thinner parts of mucus have been absorbed, it readily sinks in water.

that the matter expectorated in phthisis contains both pus and mucus, which must be the case whether it comes from an ulcer or not.

Baglivi says, that an excretion of small granules by coughing, which, squeezed between the fingers, have much fetor, certainly indicates a latent vomica. Dr. Stark also observes, that when the matter expectorated is yellowish and in small round masses, it probably comes from small vomicæ. Dr. White, however, remarks, that he has seen an expectoration of this kind without any bad consequences, an observation I have heard made by others, so that it is probable a purulent or some other secretion may assume this appearance without the presence of vomicæ.

We may, I think, with more certainty determine whether the matter expectorated comes from an ulcer or not, by attending the accompanying symptoms, than by any examination of the matter itself while it retains the appearance of mere pus. Where there is no ulcer, I think, from many cases which have fallen under my care, the hectic is less exquisitely formed, and, in particular, the morning sweats are more moderate and easily checked. In considering the causes of phthisis, we shall find some circumstances tending to assist this diagnosis.

Upon the whole, however desirable it may be to distinguish the purulent secretion of an inflamed surface, from that of a sore in the lungs, it seems, in the present state of medical knowledge, that this can only be done with certainty when the purulent matter, as frequently happens in phthisis, is mixed with the blood or sanies discharged from ill conditioned sores.

The colour and consistence of the matter expectorated is various. It is often ash coloured, yellow, or green, and very frequently all these colours are perceived in it. It is generally more or less viscid, and more or less charged with air bubbles, and the blood, which is so often mixed with it, is of different shades. Calcarious matter is sometimes expectorated in phthisis, now and then from the beginning of the complaint, and the presence of this matter, indeed, seems often to occasion the other symptoms.

Sometimes a white, tough, ramified matter, which has the appearance of small branches of the bronchiæ, is coughed up. It consists of inflammatory exudation, which becomes dry and tough, assuming the form of the cavities in which it is deposited. The same matter is sometimes observed in the stools of phthisical patients, from their swallowing the sputa, which they should always be directed to avoid.

The quantity of the matter expectorated is various. In most cases it gradually increases as the disease advances ; and after it

assumes the purulent appearance, often amounts to ten or twelve ounces, a pound, or even more, in twenty-four hours. It is common for the quantity of sputa to decrease towards the fatal termination, especially when the sweats become very profuse, and more frequently after the colliquative diarrhœa comes on — When this happens, it has been observed, that very little matter is found in the vomicæ after death.

It is chiefly after the expectoration of pus commences, that phthisis has been regarded as contagious. I shall presently have occasion to make some observations on this opinion, and likewise on the much disputed question, whether hectic always arises from the absorption of pus.

In most phthisical patients, particularly during the exacerbations, the breathing is hot, quick, and laborious, and after the disease is advanced at all times offensive. It is not uncommon for it to be attended with a rattling or wheezing, sometimes very remarkable, at others, only to be perceived when the ear is placed near the thorax of the patient. They are occasioned by the secretion from the bronchiæ which the patient is too weak wholly to expectorate.

The dyspnœa is generally attended with a sense of weight or tightness in the breast, and walking, and every other exertion which adds to the force of the circulation, increases it. Sometimes the breathing is easier when the patient lies on one side than on the other, and sometimes it is easiest when he lies on the back.

It has already been observed, that, particularly in the beginning of the disease, when the cough is generally dry or attended with a scanty expectoration of mucus, there is often no fixed pain, but wandering stitches in the thorax. In some cases there is no pain of any kind at any period of the complaint. In the majority, however, there is sooner or later a fixed pain in some part of the thorax, seldom acute, and sometimes only to be felt when the patient makes a deep inspiration or coughs.

It was observed above, that at the commencement of phthisis, the fever is often very irregular, not assuming the form of hectic till the disease is considerably advanced. In many cases the fever is wholly absent for some time after the cough and pain have made their appearance.

It is of much consequence to attend to the state of the pulse at the commencement of phthisis, for when it is uniformly more frequent and harder than natural, without the characteristic symptoms of hectic, and, at the same time, the symptoms which particularly indicate the presence of tubercles, (which I shall soon have occasion to enumerate) are observed, there is reason to suspect that some of these are inflamed, but not advanced to suppu-

ration. In this kind of fever, the tongue and skin are dry, and the appetite not so good as it generally is in hectic. We must not, however, mistake the transitory frequency of pulse, so remarkable in delicate people after meals, for this fever. I have known people in their ordinary health in whom the pulse often rose after dinner, for weeks together, to about 110 or above it, and the fever run so high as to render it necessary to go to bed. This state is readily distinguished from the cases I am speaking of, in which the pulse is seldom much under 90. In the former, before dinner, it is not perhaps more frequent than natural, and about eight or nine o'clock in the evening, the time at which the fever in phthisical patients is very considerable, in this case it is hardly, perhaps, to be perceived, unless the patient has been using violent exercise, been exposed to a cold damp evening, or other causes, which support fever.

Whatever form the fever may at first assume in phthisical cases, it almost always gradually becomes a well formed hectic. This generally happens about the time that the matter expectorated begins to assume a purulent appearance, sometimes before this period, seldom long after it.* The face then becomes pale, and the redness of the cheeks more circumscribed. In some patients the lips are remarkably pale; in others, both these and the internal canthus of the eye, very florid, while the adnata assumes a dead white. The evening exacerbation, and sometimes that at noon, soon become very evident.

The fever has generally been observed to run highest in the most robust, and, consequently higher in men than in women, but it never rises to an alarming height, scarcely ever being attended with any degree of delirium, and rarely with head-ach. The thirst is not considerable, the tongue is moist, and, particularly in the advanced stages of the disease, remarkably clean and in some degree inflamed. In some cases it grows dry and painful, and towards the termination of the disease is often covered with aphthæ.

The skin in the progress of the paroxysm is hot and dry, and sometimes hard and painful to the touch, the patient generally complaining of much heat in the hands and feet.

The pulse which during the remission is seldom under 90, small, and at an early period for the most part hard, is generally during the exacerbation, particularly in those of an irritable habit, near 120, and often above 130.

The appetite, though generally good, is not universally so; to-

* There are cases of well marked phthisis on record, in which the fever never assumed the form of hectic. I have known many die of this disease, in which the leading characteristics of hectic, the evening chills and morning sweats, were never such as particularly attracted the patient's notice.

wards the fatal termination it sometimes becomes voracious. The bowels at the commencement, during most of the progress of the disease, are for the most part costive.

The menses often cease at an early period, more frequently when the sweats become profuse, and sometimes not till the diarrhœa comes on.

The eyes sink, the nails shrivel and become incurvated. There is now much anxiety, particularly during the exacerbations, and the breathing is short, hurried, and laborious. As the debility increases, the sweats become more profuse; and, there is hardly any complaint in which emaciation goes to so great a length. The joints seem swelled, and almost every furrow in the bones becomes evident.

It is after the complaint has arrived at this stage that the sweatings seem to lessen every other secretion. The mouth becomes dry, the bowels more costive, the hair falls off. The urine, which from the beginning of the hectic fever is scanty and high coloured, now becomes more so, still continuing to deposit a copious furfuraceous sediment. Even the expectoration, as I have already had occasion to observe, whether of pus or not, is generally diminished. It sometimes happens, indeed, towards the fatal termination, that the sputa are increased by a considerable admixture of blood, the increasing ulceration destroying many of the smaller vessels.

The sediment from the urine in phthisis has been improperly termed lateritious, from its generally appearing reddish, but it seldom falls to the bottom of the vessel, and forms itself into chrystals, like red sand, as the lateritious sediment does. It seems owing not to the absorption of pus, as has been supposed, but merely to the great increase of perspiration. It is of the same nature with that which may at any time be produced by exciting the action of the skin.*

Thus the symptoms proceed till the last stage commences, which begins with the diarrhœa that almost universally attends the termination of this as well as many other fatal complaints. When the diarrhœa comes on, the sweats generally become less profuse, sometimes cease altogether, and the two affections now and then alternate for some time before death. It is very remarkable, that not only the purulent expectoration sometimes ceases at this period, but even the fever itself, the pulse falling to 70 or 80, but these changes do not improve the prognosis. The colliquative diarrhœa in phthisis is sometimes purulent. Does the occasional absence of fever at this period ever arise from the pus being discharged in this way?

* See the experiments in Appendix ii.

Phthisis sometimes runs a very different course from that which has been described, and one that has not been sufficiently noticed. I have seen it prove fatal, where not only there was neither hectic fever nor purulent expectoration, but even little or no emaciation. In one case of this kind, in which I examined the lungs after death, they were found almost wholly converted into a cluster of tubercles, and life was extinguished by no other cause but that the lungs were rendered unfit to perform their functions. The strength was by no means exhausted, and the person who opened the body said he seldom had seen so much fat about the heart. There was pus in some of the tubercles, but it is probable that absorption had been prevented by the callosity of the sides of the abscesses. Such cases are to be distinguished by the symptoms which denote the presence of tubercles.*

When hectic fever is attended with the local symptoms of phthisis, it is readily distinguished from other fevers. When the former are less distinctly marked than usual, it is sometimes confounded with quotidian remittents, especially as these are frequently attended with some affection of the chest. If, however, we attend to the history and causes of these diseases, we shall seldom be at a loss to distinguish them. It will often appear that the remittent has formerly been an intermittent, or that it has been gradually assuming more of the continued form. The fevers prevalent in the neighbourhood, or the presence of marsh miasma, will often point out its nature. Besides, in remitting fever the sweats are less profuse, and the duration of the paroxysm much longer, than in hectic. Where, however, we cannot distinctly trace a local affection, we must be cautious in admitting the fever to be hectic. In cases where the local affection is indistinct, we shall often find, on enquiry into the history of the case, that at some former period it has constituted a greater share of the disease. The great emaciation and the peculiar habit which disposes to phthisis, assist the diagnosis in doubtful cases, which are very rare, the symptoms of this complaint in general being sufficiently marked.

After the appearance of the diarrhœa, which no means are capable of interrupting for any considerable length of time, all the symptoms grow rapidly worse. The breath becomes extremely fetid, the matter expectorated is often so much so that even the patient himself can hardly bear the smell of it. A sense of great anxiety and often nausea harrass him; the pulse is small and extremely frequent; the voice becomes hoarse, or fails altogether; the hands, legs, and feet swell; the eyes become dim and sink; the temples fall in, and the nose is sharpened; symptoms which are gradually increasing from an early period, but are now most remarkable.

* See the section on the causes of phthisis.

The urine is often pale, muddy, and sometimes in considerable quantity.

Sometimes the patient complains of head-ach, which is now and then followed by some degree of delirium. In other cases vertigo and fits of syncope come on.

In the mean time the discharge from the bowels becomes more fetid and profuse. The pulse flutters the extremities become cold and the patient, at length exhausted, imperceptibly expires, for death in this complaint is almost always easy.

It is not uncommon for the cough to cease as the fatal termination draws on, while the anxiety and dyspnœa increase.

Strange as it may appear, amidst the horrors of this situation, the patient's hopes seldom abandon him and sometimes seem even to increase as the fatal termination approaches. "Nor is this illusion," says Desault, "confined to those who are ignorant of medicine. I have even seen physicians just expiring with this complaint, who would not admit that they were phthisical. Tant il est vrai que l'amour de la vie nous seduit et nous persuade aisément ce que nous desirons avec ardeur." But in the nature of the disease itself, which increases by so imperceptible degrees, and to the last leaves the mental faculties so little impaired, we are in part at least to look for the cause of this deception.

The last stage of phthisis is sometimes prevented by hemorrhagy from the lungs, which proves suddenly fatal.

The duration of phthisis is various ; many labour under it for years, the symptoms becoming worse in spring and autumn.

It is not uncommon for it to last for two or three years, and there are cases in which it is said to have lasted for 20 or 30.* Cases of this kind, however, are extremely rare, at least where considerable intermissions have not occurred, and are probably not a little exaggerated. It is thought by some that the duration of the complaint is generally the greater, the older the patient is. The usual duration of phthisis is from two months to two years.

When it runs its course very rapidly it greatly resembles pneumonia, and, indeed, imperceptibly runs into this complaint ; so that the only differences to be perceived are, that the inflammatory symptoms in phthisis are for the most part less severe, the purulent stage better marked, and the emaciation more rapid, circumstances which depend on the languid nature of the inflammation in phthisis, and the peculiar habit of those who are subject to this disease.

Purulent collections about the fauces, when the matter is gra-

* See the observations of Lieutaud and others on this disease.

dually discharged, so as to be thrown out by coughing, have sometimes been mistaken for phthisis, and have even deceived the most experienced; cases of which the reader will find related by Raulin and others. The patient should therefore be questioned whether he feels any uneasiness about the face or throat, which generally attends abscesses of these parts and forms the best diagnosis. When any complaint of this kind is made, the internal fauces should be carefully examined. The breathing of the course is then either not affected, or affected in consequence of some tumour or other disease about the larynx. Upon the whole, however, it may be affirmed, that in ninety-nine cases of a hundred, where the sputa are purulent and the patient labours under hectic fever, the complaint is phthisis.

SECT. II.

Of the morbid Appearances on Dissection.

VARIOUS morbid appearances are observed on opening the thorax. In some cases the lungs exhibit nearly the same appearances as in pneumonia. For, as was observed when we were considering that complaint, if the bursting of the abscess does not occasion suffocation, nor its sides become so indurated as to prevent absorption, it soon produces hectic fever, and the other symptoms of phthisis, with or without purulent expectoration, according as the abscess has or has not formed a communication with the bronchiæ.

It appears, we have seen from a variety of observations, that there have been cases of phthîsis without either an abscess or an ulcer of the lungs. All that is remarkable on dissection in such cases, are traces of inflammation, and a quantity of pus in the branches of the bronchiæ.

But the most common of all the morbid appearance in the lungs of those who die of phthisis, are tubercles. These are hard tumors, from the smallest sensible size to about half an inch or an inch in diameter, situated, Dr. Stark observes, in the cellular substance of the lungs. They are of a light colour, and if they have not suppurated, generally solid throughout. In the same subject they are found of various sizes, and they frequently appear in clusters. No vesicles, cells, or vessels are to be seen in the solid tubercles, even on examination with a microscope, and after the pulmonary artery and vein have been injected.

On the cut surface of some are observed small holes, as if made by the pricking of a pin, and at the bottom of the cavities containing pus several small holes are frequently to be seen, from which on pressure, purulent matter issues, but neither of these seem to communicate with any vessels.

The purulent cavities of tubercles are of different sizes, from the smallest perceptible to half an inch or three quarters of an inch in diameter, and when cut through and emptied, have if the suppuration has been completed, the appearance of small white cups, nothing remaining of the substance of the tubercle, except a thin covering or capsule. The cavities of less than half an inch diameter are generally shut, those which are larger open into the bronchiæ by one or more holes. The largest vomica which are generally of an oval shape, are lined partially or wholly with a smooth, thin, tender slough or membrane. The matter found in these cavities is similar to that expectorated, and has seldom any admixture of blood, except where there are ulcerations. The vomica often communicate with each other by ragged openings.

The larger vomica, which have numerous bronchial openings, are found to contain scarcely more matter than is sufficient to besmear their surface. The largest are generally situated towards the back part of one of the upper lobes. Several small apertures on the surface of the lungs often lead to the vomica; and sometimes, though not often, a vomica is a hemispherical cavity in the external part of the lungs.

Wherever there is a vomica, there is a broad and firm adhesion of the pleura, so as to preclude all communication between the cavity of the vomica and that of the chest; even tubercles, indeed, are seldom found without adhesions.

Those parts of the lungs which are contiguous to tubercles, are red, sometimes soft, but more frequently firm and hard. And whilst the sound parts of the lungs are distended by blowing into the trachea, the parts near to tubercles and vomica remain depressed and impervious, whether the air be blown through the trachea or into incisions made in the surface of the lungs. So that the function of the lungs in those parts is wholly lost.

The pulmonary arteries and veins, as they approach the larger vomica, are suddenly contracted; and when outwardly, the vessel appears nearly of the proper size, the cavity is still found to be much lessened, being almost filled up by a fibrous substance. The vessels passing along the tubercles are often found detached from the neighbouring parts for about an inch of their course. When the lungs are injected, the injection is rarely found to have entered the middle-sized vomica, and very seldom the larger or smaller ones.

The branches of the bronchiæ are never found contracted.—The internal surface of those which open into the larger vomica is often of a deep red colour, seemingly from the enlargement of vessels, and the internal surface of the trachea itself is sometimes partially red.

In different cases the morbid appearances are more or less considerable. From a rude calculation, made on the lungs of many who died of phthisis, the part which remains fit for the admission of air may, at a medium, be estimated at one-fourth of the whole. The higher and posterior parts are more frequently affected and to the greatest degree, and the lungs on the left side, it is said, more commonly than those on the right.

The lymphatic glands of the chest are of a dark colour, and sometimes contain a matter like moistened cheese.*

When calcarious matter has been expectorated, it is generally found in the lungs in considerable quantity. The pleura costalis and the pleura of the lungs sometimes adhere almost throughout their whole extent. Ulcers are often found in the branches of the bronchiæ, and sometimes in the trachea itself. When the ulcers are confined to the trachea, the complaint cannot be regarded as phthisis.† In some cases of phthisis, where ulcers have been found in the trachea, there has been reason to suppose that they first attack this part and afterwards spread to the lungs.

It is not uncommon to see a whole lobe, or even a larger portion of the lungs, almost consumed by suppuration. We even hear of cases where half of the lungs has been consumed so that it was surprising that life could go on so long.

The abdominal viscera are often much affected. Dr. Stark says, that there is seldom any morbid appearance in them, except slight erosions of the villous coat of the intestines. But other writers mention induration, enlargement, ulceration, and abscess of the liver, spleen, and other abdominal viscera. The most common of these appearances is enlargement of the liver, which is often very perceptible to the touch previous to death, and is, as will appear, I think, from what I shall have occasion to say of the causes of this disease, often more essentially connected with it than has generally been supposed.

With regard to the ratio symptomatum of phthisis, it may be observed, that the symptoms of this, like those of most other complaints, are either such as we can at once account for, or whose causes are involved in so much obscurity, that little can with certainty be said of them. It is unnecessary to inform the reader, that the irritation occasioned by the matter in the bronchiæ causes coughing, or that the ulcer in the lungs is the cause of the pain. It is impossible to be acquainted with the appearances on dissection, without making these inferences. But who

* See Dr. Stark's Treatise, from which the foregoing observations are extracted.

† For an account of the phthisis trachealis, see the Institut. Med. Pract. of Bursarius.

can explain why the cheeks become florid, in proportion as the adnata becomes pale ; or why the discharge by the skin is at a certain period of the disease exchanged for that by the bowels. I should, therefore, have passed over in silence the ratio symptomatum in this, as I have done in most other cases, were it not that the disputes concerning the cause of the hectic fever has rendered this part of the ratio symptomatum of phthisis interesting.

Many attribute hectic fever to the absorption of pus ; others maintain that it never arises from this cause. Both sides of this question have been supported by arguments of two kinds ; the one, inferences from matters of fact ; the other, certain reasonings derived from the sensible and other qualities of pus, concerning the effects it would probably produce if received into the mass of blood. I shall confine myself to a short review of the former arguments, because I can find none of the latter at all satisfactory, nor does the state of our knowledge seem to admit of reasonings of this kind.

The principal arguments tending to prove that hectic fever does not arise from the absorption of pus are, that abscesses, even of a considerable size, have existed for years without occasioning hectic fever ; for the most part indeed producing fever, but fever of a very different nature ; after the amputation of a considerable limb, a very large surface is constantly covered with pus, and even exposed to the air, a circumstance acknowledged to favour the production of hectic fever, yet this fever rarely appears ; towards the end of dropsy, where there is no abscess hectic fever often shews itself ; when any acrid matter is absorbed, we generally find tumours in the lymphatic glands through which it passes ; when a purulent ulcer is attended with hectic fever, this is not observed ; it has been maintained that hectic fever is often completely formed when there are inflamed tubercles in the lungs before suppuration has taken place. " In recent affections of the lungs," Dr Reid observes, " when their substance is inflamed, and tubercles formed but not suppurated, the fever is continued, and similar to that attending inflammations of the pleura and other parts of the body. When the lungs become more diseased, their surface obstructed and indurated, so as not to be pervious to the air in respiration, the fever changes its type, has remissions in the forenoon, and exacerbations in the evening, terminating by sweat on the breast and upper parts of the body towards morning. If the hectic fever is occasioned," he adds, " by the acrimony of pus absorbed from the diseased lungs, from whence does it proceed before the tubercles are suppurated, or any pus formed in the lungs ?" Were we assured that this observation is well founded, it would be sufficient to determine the point ; but this is far from being the case. There are many instances of debility, emaciation, and fever, which by careless observers, might be mistaken for

hectic, especially as it is frequently attended with some degree of morning sweats, without suppuration having taken place in the lungs ; but it does not appear that exquisitely formed hectic ever supervenes in phthisis till pus has been formed. The foregoing observation of Dr. Reid, therefore, may be set aside. It will be necessary in a cursory manner, to consider the other arguments just mentioned.

Those who maintain that hectic fever is always the consequence of the absorption of pus, admit that abscesses have sometimes been known to continue for a long time without producing fever, and much more frequently without producing hectic fever ; but in these cases there seems, they think, to be little absorption of pus, the sides of the abscess having become callous and the abscess itself continuing without either increase or diminution, and giving little or no uneasiness.

Towards the fatal termination of dropsy, it is granted that hectic fever often makes its appearance. But on laying open dropsical cavities after death, the dropsical fluid is often found more or less mixed with pus, and what is drawn off by tapping, for some time before death, is often in the same state. Besides, towards the fatal termination of ascites, there is often an expectoration of purulent matter.

With regard to pus not occasioning tumors in the lymphatic glands, in its passage to the blood, it may be said, that pus is not of a nature apt to irritate or inflame these glands ; in the same manner as the matters of syphilis and cancer, which inflame the glands, are not fitted to excite fever.

The only remaining argument is, that of hectic fever not so frequently succeeding large wounds, as it ought to do, were it occasioned by the absorption of pus. This seems to be the argument of most weight, and to which it is not easy to find a satisfactory answer. It may be observed, however, that it is not very common for wounds to continue to form a great deal of pus for a considerable length of time, and when they do, they often produce hectic fever. The removal of the dressings, and frequent cleaning of the wound, must tend to prevent the absorption of pus. While granulations are going on, the matter secreted is less copious and more bland and thick than when the wound is ill conditioned, as is generally the case in ulceration of the lungs. The former we have reason to believe, is less apt to be absorbed ; and when absorbed, less apt to occasion fever.

In addition to these observations, it is maintained that hectic fever is never distinctly formed without the presence of purulent matter in some part of the body.

The conclusion seems to be, that if the common opinion that hectic fever in phthisis is the consequence of the absorption of pus, is not wholly established, it is at least the most probable of the two.

SECT. III.

Of the Causes of Phthisis Pulmonalis.

THIS disease is mentioned in the medical writings of every period, from the days of Hippocrates to the present time. It is a disease of temperate climates, and in no country so frequent as in Great-Britain. In London it is said that 5000 die annually of consumption. Allowance, however, must be made for many diseases passing under this name, which are of a different nature. But the proportion of those who die annually of phthisis in Britain, is certainly very great. Sydenham alleges, that two thirds of those who die of chronic diseases fall a sacrifice to it.

Those who are of a slender make, with a long neck, delicate smooth skin, and a fair ruddy complexion, with white and transparent teeth ; who have a flat or narrow chest. with high shoulders. and stoop when they walk ; who possess an habitual and great flow of spirits, with an early acuteness of understanding, are most liable to phthisis.

As the make and habit of body is hereditary, some account in this way for phthisis being so, and we have every reason to believe that the peculiar make and habit of body alone are sufficient to dispose to the disease, but we often see the children of phthisical parents, who inherit very little of this habit, fall a sacrifice to phthisis. When we come to speak of the causes of tubercles, we shall find that there are other circumstances which tend to shew that the hereditary disposition to phthisis does not wholly consist in any habit of body that is observable.

Women upon the whole, are more liable to phthisis than men, and those between the age of puberty and 35, than others. It appears, however, much later than 35, and sometimes, though more rarely, long before puberty. Children have been born with all the symptoms of phthisis, and died of it a very short time after birth.

The climate then, the hereditary disposition, the female sex, and the most vigorous period of life, may be regarded as the predisposing causes of phthisis. The other remote causes of this complaint may be termed exciting. When, however, several occasional causes are applied successively, some of them in almost every instance act merely as predisposing.

A great variety of causes have been enumerated, as capable of

exciting phthisis. They may be divided into three classes. The first comprehending those causes which exist in the lungs themselves, and the parities of the thorax ; the second, external causes acting on the lungs ; and the last, causes acting on the system in general.

The causes existing in the lungs themselves, and the parities of the thorax, are tubercles, suppuration of the lungs in consequence of common pneumonia forming either an open ulcer or a vomica, the presence of calcarious concretions in the lungs, hæmoptisis, catarrh, asthma, metastasis of pus from other parts to the lungs, extensive adhesions of the pleura, fracture or exostosis of the ribs, and mal-confirmation of the thorax.

The external causes acting on the lungs are, bad air, dust taken in with the breath, other irritating matter introduced by the trachea from aphthæ or other affections of the mouth, contusions and wounds of the thorax.

The causes of phthisis affecting the system in general are, an inactive sedentary life, indulging much in the use of intoxicating liquors or in venery, the lues venera, suppressed hæmorrhagies, certain eruptive fevers, any repelled eruption, in short, whatever greatly debilitates or tends to occasion a plethoric state of the system ; and many add to these causes, contagion.

I shall make a few observations on each of the foregoing causes. I shall not, however, follow the order in which they have been mentioned, but divide the subject into two parts ; the first, treating of tubercles, the most frequent cause of phthisis, and the causes which produce them ; the other, of those causes which occasion phthisis without producing tubercles.

I have already had occasion to describe the appearance of tubercles. What I am now about to say of them may be divided into an enumeration of the causes which produce them, and of the symptoms which indicate their presence while they are in an indolent state.

It seems now very generally agreed among physicians, that the predisposing cause of tubercles is in most, if not in all cases, a scrophulous habit. Tubercles resemble the scrophulous swellings of lymphatic glands in other parts of the body ; like these too their progress to suppuration is generally slow, and the ulcer formed by them is difficult to heal. Those born of scrophulous parents are most subject to tubercles. They are often accompanied with scrophulous affections in other parts of the body, mesenteric obstructions, glandular swellings in the neck, &c. It often happens in the same family, that some are affected with external marks of scrophula, others with phthisis. Those who have been much troubled with scrophulous swellings and sores at an early period of life are often attacked with phthisis about the age

of puberty or soon after it. Besides, where no scrophulous taint can be observed either in the patient or his relations, his habit is generally of that kind which accompany scrophula, and gives reason to believe that the constitution is not free from a tendency to it. The scrophulous habit is marked by the sanguine temperament, a fine skin and complexion, large veins, soft flesh, and thick upper lip. These circumstances leave little room to doubt the scrophulous nature of tubercles. Dr. Cullen, indeed, and other writers have enumerated causes as capable of producing tubercles, independently of any scrophulous affection. It would seem, however, that these causes act merely as exciting.

“Another species of acrimony,” Dr. Cullen observes; “producing tubercles, and thereby phthisis, may be said to be the exanthematic. It is well known that the small-pox sometimes, and more frequently the measles, lay the foundation of phthisis. It is probable also, that other exanthemata have the same effect, and from the phenomena of the disease, and the dissections of persons who have died of it, it is probable that all the exanthemata may occasion phthisis, by affording a matter which in the first place produces tubercles.” Concerning these observations, it may in the first instance be remarked, that the idea of exanthematic acrimony being lodged in the lungs, and there producing tubercles, is merely hypothetical. It is by no means a fair inference, that because phthisis follows a disease produced by the introduction into the body of a certain morbid matter; the former complaint, as well as the latter, arises from the presence of this matter. We have every reason to adopt another opinion. Sometimes in small-pox and more frequently in measles, there is an evident tendency to pneumonia; and it is where this tendency is most considerable, and in those of a scrophulous habit, that phthisis is apt to supervene on these fevers, and in such habits tubercles may be excited by whatever tends to irritate and inflame the lungs, as will evidently appear from a consideration of their other causes.

Similar observations are applicable to the other supposed acrimonies deemed capable of producing tubercles. In some of these instances the debility occasioned by tedious disorders seems to be the exciting cause. It is well known that, in the predisposed, whatever debilitates may give rise to scrophulous affections.

Such are the circumstances which would induce us to believe that tubercles, and consequently phthisis when it proceeds from them, as in by far the majority of cases it does, are a scrophulous affection. It was to this I alluded when it was observed, that the hereditary disposition to phthisis consists in something more than the observable peculiarity of habit, for although a peculiar habit often marks the scrophulous tendency, this is by no means universally the case. The most unequivocal marks of scrophu-

la often appear in those who have none of the marks of such a habit.

If tubercles are a serophulous affection, and if ulcers of the lungs generally proceed from tubercles, it is not surprising that phthisis is so fatal. We know with what difficulty serophulous ulcers in external parts are cured, and the constant motion and access of air, and the impossibility of cleaning or applying dressings to ulcers of the lungs, must render them still more obstinate there.

It appears then that the predisposing cause of tubercles, is a serophulous habit; we are now to take a view of their exciting causes.

It has been observed, and not without reason, that the commencement of phthisis, from whatever cause, so frequently resembles catarrh, and has so often been mistaken for it, that there is reason to believe this complaint less frequently the cause of phthisis than is generally supposed.

Catarrh has been ranked among the causes of phthisis as long as the complaint has been known. There are three ways in which it may occasion an ulcer of the lungs. It may give rise to pneumonia or hæmoptysis, which I shall soon have occasion to consider as causes of phthisis. But the manner in which it most frequently operates is by exciting tubercles. This it may do, merely by the violent and repeated agitation of the chest when the cough is severe and long continued, or it may excite them in the same way that we see tumours of the lymphatic glands occasioned in external parts, by taking cold; and this we have reason to believe is the way in which catarrh generally operates, for its tendency to produce tubercles is by no means proportioned to the severity of the cough.

It is generally supposed, and certainly with reason, that the contagious catarrh, the influenza, is more apt to produce tubercles than that which proceeds from cold, which is probably owing to the greater severity of the former.

I may here mention, by the bye, to save the necessity of recurring to catarrh as a cause of phthisis, that it sometimes excites an inflammation of the internal membrane of the bronchiæ, occasioning a purulent exudation from its surface, which seems sometimes to degenerate into phthisis without ulceration. I have already had occasion to remark, that pus is sometimes expectorated in catarrh. It would seem that this purulent expectoration has now and then gradually increased, without any ulceration of the lungs, and at length becoming copious and in some measure habitual, has given rise to hectic fever. Dr Cullen and others doubt of such cases having existed, but their doubts seem chiefly to arise from a belief that pus is rarely, if ever, formed without

ulceration. Copious and habitual expectorations of phlegm, says Raulin sometimes become purulent and degenerate into phthisis, particularly after irregularities of diet, or any thing else which impairs the healthy state of the fluids.

Few physicians have been long engaged in practice without meeting with cases in which asthma terminated in phthisis, and that so powerful an irritation applied to the lungs should occasion tubercles in the predisposed, or inflame them where they already exist, does not seem surprising.

It has been a common opinion, that syphilis occasions phthisis by producing venereal ulcers in the lungs. This is possible, at the same time there is no direct proof of it, and there are other ways much more probable of explaining the concurrence of these diseases.* The general opinion is, that the syphilitic matter occasions tubercles; and Dr. Cullen seems even to suspect that it may have this effect where there is no predisposition.

It is very doubtful, however, if this matter ever produces tubercles, even in the predisposed. Syphilis seldom occasions phthisis, except in scrophulous habits, and even in these phthisis is seldom the consequence of its first attack. The affection of the lungs rarely makes its appearance till after the constitution has been debilitated by repeated attacks of lues. But in such habits, whatever debilitates may have the same effect. The immoderate use of venery has often occasioned phthisis where no venereal complaint had been contracted;† and indeed such causes produce, as I have already had occasion to observe, all the various forms of scrophula. From these circumstances it appears probable, that syphilis only tends to produce phthisis as it tends to debilitate; and we have reason to believe that the very debilitating remedies employed, and often continued for so great a length of time, in syphilis, have no small share in this effect. It appears highly probable, that some other diseases, particularly the scurvy, which have been supposed to occasion phthisis by the application of some peculiar acrimony to the lungs, act in the same way.

Among the exciting causes of tubercles, a mal-conformation of the thorax is one of the most frequent; nor is it necessary that it should go the length of deformity to have this effect. It

* Ulcers of the mouth of various kinds sometimes spread to the trachea and lungs; and in this way venereal ulcers seem sometimes to have occasioned phthisis. Inveterate aphthæ of the mouth, (Raulin observes) which proceed from some scorbutic, scrophulous, venereal, or other diseased state of the habit, spread to the pharynx and larynx, and produce ulcers in the œsophagus and trachea, which occasion the symptoms of a confirmed phthisis.

† The reader will find excessive venery ranked among the causes of phthisis, by Raulin, Lieutaud, and others.

seems equally pernicious whether it arises from the distance between the spine and sternum. or that between the sides of the chest being smaller than it ought to be. The binding up of children with rollers, and the use of stays, are ranked among the causes of mal-conformation. As any mal-conformation of the bones of the chest renders the breathing less free, and slight irritations applied to the lungs where some irritation already exists will be sufficient to excite coughing ; it is not surprising that it should dispose to tubercles. It is a common observation, that those who are subject to coughs from any cause are, *cet. par.*, most liable to phthisis. An habitual tendency to coughs may proceed from a variety of causes. It seems often to arise from tubercles themselves in an indolent state, and very often, we have reason to believe, merely from that peculiar state of the lungs which disposes to tubercles.

In the production of phthisis, too much, perhaps, has been attributed to the agitation of the lungs in coughing. We see the most violent coughs continue for a great length of time without shewing any tendency to produce this complaint. How much more frequently is measles than whooping cough the cause of phthisis. At the same time, where a disposition to tubercles exists, the agitation of the lungs in coughing may tend to produce them.

An inactive sedentary life seems to dispose to tubercles in two ways ; by debilitating the system in general and by the habit of stooping hurting the lungs in the same way with mal-conformation of the chest. It has been observed, that occupations which confine the body to a bent posture are particularly favourable to the production of this disease.

The free use of intoxicating liquors is a frequent cause of tubercles. All causes of plethora have the same tendency. Suppressed hemorrhagies, the drying up of issues or old wounds, &c. It frequently happens, that where the symptoms of phthisis have been removed by an issue, they return on drying it up. Although suppressed hemorrhagies seem frequently to produce tubercles, they oftener, perhaps, induce phthisis, by occasioning hæmoptysis. The suppression of the menstrual discharge, hæmorrhoids, and epistaxis is most frequently succeeded by phthisis. The retrocession of eruptions is also to be ranked amongst the causes of tubercles.

Bad air is mentioned by writers as a cause of phthisis ; and it is probable that it likewise operates by producing tubercles, or tending to inflame them. What was said of bad air when we were speaking of gout is applicable here. Moisture seems still to be the noxious principle. A moist air materially affects the breathing in asthmatic people. It seems likewise to dispose to phthisis by occasioning general relaxation and debility. The fire-

quency of phthisis in Holland has been attributed to this cause. The good effects of sea voyages in this complaint might be urged against the probability of a moist air occasioning phthisis. To this objection, however, the reader will find a sufficient answer in the first volume, in the section on the causes of intermitting fever.

Breathing a dusty atmosphere seems also to apply such an irritation to the lungs as sometimes inflames the tubercles, if it does not excite them. "I have not," Dr. Cullen observes, "met with many instances of phthisis which could be referred to exposure to dust; but from Ramazzini, Morgagni, and some other writers, we must conclude such cases to be more frequent in the southern parts of Europe."

Phthisis sometimes follows blows or wounds of the thorax.—These may occasion phthisis in several ways. In producing tubercles they seem to act in the same way with many of the foregoing causes, by giving a tendency to inflammation of the lungs, which, from whatever cause it proceeds, seems so apt to occasion tubercles in the predisposed.

Among the causes of tubercles too are ranked malignant fevers, and the debility of lungs often left by diseases of the chest, when the patient is too weak wholly to expectorate the matter secreted in them. These must be ranked with causes of debility. In the latter case, indeed, as in catarrh, the mucus secreted in the lungs may gradually assume the appearance of pus, in consequence of the inflammation of the internal membrane of the bronchiæ, and thus occasion phthisis without either abscesses or ulceration.

One cause of tubercles, which appears to me to operate very frequently, has been but little noticed by writers; Raulin and some others mention it, obstructions of the abdominal viscera, particularly an enlarged and indurated state of the liver, cases of which I have known prove fatal, by inducing phthisis, without the practitioner having been aware of the cause which supported the disease. The formation of pus seems in most of these cases at an early period to be unattended with ulceration, sometimes perhaps, even with tubercles, for I have seen many supposed to labour under phthisis speedily relieved from the most urgent symptoms, by the means which remove the enlargement and induration of the liver. If the case is neglected, however, tubercles and ulceration succeed, and then it is too late to afford permanent relief. The manner in which an indurated liver pressing on the lungs may occasion phthisis, is evident.

If contagion is ever the cause of phthisis, it is probably by producing tubercles. It seems less probable that it should give rise to the other changes which precede phthisis, pneumonia, hæmoptysis, &c. Phthisis has not been regarded as contagious till after

the purulent stage commences. The reader will find in authors, particularly foreign authors, a variety of cases in which it seems to have been produced by contagion. It is to be observed, however, that as in some countries it is very frequent, and particularly as it is hereditary, it is probable that in many instances it has been ascribed to contagion when it arose from other causes. How far we should attribute its production to the fatigue and anxiety of mind occasioned by attendance on the sick in so tedious and hopeless a disease, it is difficult to say. However this may be, it does not seem improbable that inhaling the feid breath of a person in confirmed phthisis may prove a sufficient irritation to excite tubercles in the predisposed, or inflame them where they exist in an indolent state. Phthisis has been regarded as contagious from very early times. It is certain, however, that it is not of a very contagious nature. There are few countries in which this complaint is so common as in Britain; yet Dr. Cullen says, that he has never known it evidently to arise from contagion. Upon the whole, the most probable opinion seems to be, that phthisis is sometimes, though very rarely, produced by contagion in the predisposed; and it does not seem improbable, that contagion has in some degree co-operated with the hereditary disposition to render phthisis so fatal as it is in some families. It is prudent, therefore, in those of a phthisical habit to avoid spending much time, and particularly sleeping in the same bed, with patients labouring under this disease. It appears highly improbable, that the clothes of consumptive patients, as some have maintained, are ever capable of communicating the disease.

Such are the circumstances which occasion tubercles. in 19 cases in 20 the forerunner of phthisis. I have already had occasion to observe, that it is not easy to determine their presence, at least before they are inflamed. In an inflamed state they occasion the symptoms which have been mentioned as forming the first stage of phthisis.

The following are the symptoms which give reason to suspect their presence in an indolent state. A slight short cough, not easily alleviated by mucilaginous medicines, increased on lying down, either without expectoration or with a scanty expectoration of a viscid matter, or, as Bursarius observes, of a matter like water in which soap has been dissolved. When the matter expectorated, says Dr. White, is thin, frothy, small in quantity, and brought up with pain and incessant coughing, tubercles or schirri in the lungs are to be expected; and Baglivi mentions a dry cough and gentle pain of the breast as the chief signs of tubercles in the lungs. The pain is sometimes acute, sometimes it is fixed, more frequently flying, and in most cases very irregular. A degree of dyspnœa uniformly increased on using exercise, or by any other cause which accelerates the circulation, is one of the best diagnostics of tubercles. If with these symptoms, the

patient becomes languid and indolent and loses his flesh, and some degree of hardness in the pulse, with occasional heat of the skin, is perceived, especially if he be of a phthisical habit, there can be little doubt of the presence of tubercles. They will sometimes continue in an indolent state for many months, or even for years, during which the patient is observed to be more subject to coughs than usual.

It remains to consider the causes of phthisis which operate in some other way than by producing tubercles.

It sometimes happens, it was observed above, that suppuration takes place in pneumonia without immediately proving fatal, nor is it always followed by phthisis. Abscesses often remain for a long time, we have seen, without occasioning hectic fever. There have even been instances in which the pus was absorbed, and the patient restored to health. In general, however, hectic fever comes on and gradually exhausts the strength, if the bursting of the abscess does not occasion suffocation.

When the matter is poured into the cavity of the thorax, it soon produces all the symptoms of phthisis, except the purulent expectoration, and sometimes this symptom also in consequence of part of the lungs contiguous to the pleura being consumed. When a small abscess from pneumonia bursts into the substance of the lungs, the quantity of matter discharged not being sufficient to occasion suffocation, a purulent expectoration is the consequence; but the chance of recovery is better than in the case of tubercles. If the constitution is healthy, the expectoration sometimes gradually diminishes, and in a short time disappears. "In an abscess of the lungs," Dr. Cullen observes, "in consequence of pneumonia, the matter poured into the bronchia is often a proper and benign pus, which is frequently coughed up very readily and spit out; and though this purulent expectoration should continue for some time, yet if an hectic does not come on, the ulcer soon heals, and every morbid symptom soon disappears. This has happened so frequently, that we may conclude, that neither the access of the air, nor the constant motion of the lungs, will prevent an ulcer of these parts from healing, if the matter of it be well conditioned. An abscess of the lungs, therefore, does not necessarily produce the phthisis pulmonalis; and if it be followed by such disease, it must be in consequence of particular circumstances which corrupt the purulent matter produced, and render it unsuitable to the healing of the ulcer, and at the same time make it afford an acrimony, which, being absorbed, produces a hectic and its consequences." Dr. Cullen's opinions concerning the circumstances vitiating the purulent matter in the lungs, are merely hypothetical.

Hæmoptysis is regarded as so frequent a cause of phthisis, that Dr. Cullen, we have seen, ranks the latter as a sequela of the former. In most cases of phthisis some degree of hæmoptysis appears at some period of the complaint; and as an ulcer, although the disease proceeds from other causes than hæmoptysis, is often present at an early period, and very frequently occasions a greater or less admixture of blood in the sputa, it is more than probable that many cases of phthisis from other causes are ascribed to hæmoptysis.

It frequently occurs without being following by phthisis, even when it proceeds from internal causes, much more when it arises from blows on the chest, or other external causes. In many people it recurs often, without being productive of any bad consequence. It is chiefly in the predisposed that it is apt to occasion phthisis, and indeed in the predisposed to phthisis that it most frequently occurs; a circumstance which still further contributes to its being regarded as the chief cause of this complaint. It is not to be overlooked, however, that when hæmoptysis frequently recurs, it may occasion ulceration in the most healthy.

It is supposed by some, that it occasions phthisis in consequence of some portion of the extravasated blood which is not expectorated, stagnating and becoming putrid in the cells of the lungs. It is not impossible that hæmoptysis may produce phthisis in this way. In most cases, however, as the latter is the consequence of repeated hæmoptysis, it seems probable that it arises from the vessels which have been frequently ruptured not healing readily, particularly in lungs inclined to disease.

Pus absorbed from other parts of the body, and deposited in the lungs, has been ranked among the causes of phthisis.*

The only remaining cause of this disease of any note is the formation of calculi in the lungs. It was observed, that these are sometimes met with in the sputa of phthisical patients. Their formation generally precedes the phthisical symptoms, and seems often to produce them. They may sometimes do so by inducing tubercles, which may be occasioned by any irritation of the lungs; but they excite phthisis, where there is no disposition to tubercles, merely by wounding the lungs. In cases of this kind the symptoms of phthisis are sometimes never com-

* Many doubt whether phthisis ever proceeds from this cause. Raulin relates a case in which the scrotum was wounded, and a considerable discharge of pus took place. This discharge gradually diminished, and the patient at the same time was seized with a frequent and troublesome cough, and began to expectorate pus, as Raulin calls it, "*le caractère*." But on bringing back the purulent discharge, the cough and expectoration ceased. The man died of the wound, and the lungs were found in them.

pletely formed, and then the termination is often favourable, if the causes of inflammation are carefully avoided.

It is a curious circumstance in the history of phthisis, that its progress is often interrupted by pregnancy or mania. The latter has been known to produce a radical cure; but almost always after delivery, and often after the removal of the mania, the disease recurs.

Of all the causes of phthisis, tubercles, as may be collected from what has been said, are the most fatal. Dr. Cullen thinks, and there is reason to believe, that there have been recoveries after the suppuration of a tubercle. They are extremely rare, and only, perhaps in cases where the ulceration is very recent.

SECT. IV.

Of the Treatment of Phthisis Pulmonalis.

IT has been common with those who have written on the treatment of phthisis to lay down certain indications of cure, which we have no means of fulfilling; that of correcting the vitiated state of the fluids, of curing the ulcer in the lungs, &c. which has often led to error.

Our views in the general treatment of phthisis are, to obviate the inflammatory tendency, and support the strength. After speaking of the means of fulfilling these indications, it will be necessary to notice certain remedies recommended as specifics in this disease, which do not come under any particular head; and, lastly, to consider the means of removing certain symptoms which occur at different periods of phthisis and whose treatment does not fall under the general plan. In the first place, then, we are to consider the means recommended for obviating the inflammatory tendency.

This indication, the reader will readily perceive from the history of the disease, has place only at an early period. There are three means of fulfilling it; by evacuations by the use of acids and neutral salts, and by an attention to regimen.

Two objections to the employment of blood-letting in phthisis present themselves: that it is a disease of much debility, and that being often of long continuance there is reason to fear a tendency to plethora, which will aggravate the symptoms, and render a more frequent employment of blood-letting necessary than the practitioner is at first aware of.

It has been the practice of many to let blood in this complaint on very slight occasions. Some have not scrupled to recommend it two or three or more times in a week, and to persevere in its use while there are any remains of the buffy coat in the

Blood ; another instance in which an attention to this appearance, without considering the other circumstances of the case, has led to erroneous practice.

The danger of recommending the most debilitating of all remedies where debility is the most urgent symptom, is too apparent to require any comment. It is now employed much more sparingly than half a century ago. When, however, the pain is severe, the breathing difficult, and the pulse unusually hard, a moderate blood-letting is often proper ; but it must never be carried further than is necessary for the relief of these symptoms, and it will generally be proper in the first place to try the effect of local blood-letting, (on the use of which in this disease I shall soon have occasion to speak more particularly) as it interferes less with the second indication, at all times to be kept in view in the treatment of phthisis. The symptoms just mentioned are such, it is evident, as can only attend an early period. It is almost unnecessary to say that when the expectoration has become purulent, and the night sweats profuse, loss of blood in any way is inadmissible. We have in view at an early period to procure a resolution of the inflamed tubercles ; in confirmed phthisis this hope no longer exists.

What has been said of blood-letting is in a great measure true of catharsis when employed with a view to lessen excitement. Sydenham recommends the free use of cathartics at the commencement of the disease, and if it ever is proper it is at this period. Blood-letting, however, is more effectual, and on several accounts is preferable for the purpose of moderating excitement. In inflammatory affections of the lungs in particular, much catharsis is seldom advisable. The use of cathartics in phthisis, therefore, should be confined merely to such as are necessary for the regular action of the bowels, which is a matter of great importance in this disease. The saline medicines, I shall presently have occasion to mention, are the best cathartics at an early period.

Diaphoretics have also been much recommended when the excitement is considerable. Of these the antimonium tartarizatum is the best. It has the double advantage of allaying the febrile symptoms and promoting the expectoration. Its debilitating effects, however, prevent the free use of it in phthisis. It is only when the skin is hot and dry that it can be employed ; and, indeed, it is only at an early period that any medicine of this kind is proper. Sassafras and sarsaparilla have been frequently used as diaphoretics in this disease, but are very insignificant remedies ; and guaiacum, which has also been much recommended, is of too irritating a quality.

Vomiting has been recommended as a specific in phthisis, and shall be considered with the other remedies of this kind.

In the employment of all evacuations used with a view to diminish excitement in phthisis, much attention to the habit of the patient is requisite.*

Of the acids and neutral salts, nitre and the saline mixture in a state of effervescence at an early period, the vitriolic acid when a tendency to sweating has supervened and at all periods, fresh acidulous fruit are the best. I have at different times had occasion to make some observations on the manner of using nitre, and the effects to be expected from it, most of which are applicable here. It should be used in a very diluted state, and never in such quantity as to oppress the stomach. Dr. Percival says, that although the pulse in hectic fever is at first reduced by the use of nitre, it afterwards rises higher than before. I have not observed the latter effect from a moderate use of it. Sal ammoniac has been much recommended by some writers either alone or with nitre, but is much inferior to the latter. Dr. Cullen thinks the vegetable acids preferable to the mineral, as they are safer and can be taken in larger quantities. This observation applies only to the early periods of the disease; after the sweats come on, no acid is equal to the vitriolic.

I shall have occasion to speak of the diet of phthisis when considering the means of fulfilling the next indication. Here I am only to point out that suited to an early period; and all that need be observed is, that while there are hopes of resolving the inflammation of the tubercles, the diet should so far co-operate with the other means employed for this purpose, that the patient should avoid those kinds of food which occasion much irritation, particularly the flesh of old animals. But there is no period of phthisis, perhaps, unless the symptoms approach to those of pneumonia, where the diet should be very spare. A milk diet, therefore, is proper at an early period, and, indeed, almost universally recommended. There are few cases in which a certain quantity of the lighter kinds of animal food may not be added to this diet, which consists of different kinds of milk with the farinaceous vegetables. Fresh subacid fruits make a useful part of the diet in phthisis, particularly when the excitement is considerable. If the patient is troubled with any redundancy of bile, they tend to correct it, and proving gently laxative, they cleanse the intestines. If they occasion diarrhoea it must be checked by mild astringents and anodynes. Hoffman even declares, that he has seen confirmed phthisis removed by large quantities of strawberries.

* "Nor would" Sir John Pringle (who made much use of the lancet in the commencement of phthisis) "recommend this mode for common practice without making great allowance for the strength of soldiers, nor without suiting the quantity of blood to be let, to the condition of weaker patients. In habits naturally weak and scrophulous, or when the patient has been long in a decay, bleeding, like other means, will be ineffectual." He might have said will hasten the fatal termination.

The mineral waters impregnated with carbonic gas, or common water combined with a large quantity of gas, have been recommended for the drink of phthysical patients. The good effects of these waters, if they have any that deserve to be mentioned, seem to arise from the effects of the gas on the stomach, to which it is particularly grateful. Very brisk small beer will generally answer the same purpose, if it does not occasion acidity.

Much attention has been paid to the choice of milk in phthical cases. Cows' and goats' milk, if used in considerable quantity oppress the stomach, so that the lighter kinds of milk, particularly that of asses, have been preferred. Asses' milk is supposed by many to serve other purposes besides those of nourishment in this complaint. How far this opinion is well founded it is difficult to say. Women's milk has, if possible, been more celebrated in phthisis. Van Swieten, Dr. Robinson, and others, relate cases in which they ascribed the removal of the disease wholly to it. Mares' milk has also been much recommended.—In short, the great objects aimed at in the diet in the first stage of phthisis is, that the food should be nourishing, easy of digestion, and afford as little irritation as possible while digestion goes on.

Such are the means of fulfilling the first indication of obviating the inflammatory tendency. The reader will perceive, that in attempting this in phthisis we have it more in view to save and support the patient's strength, than in the other inflammatory diseases which have been treated of. This seems to arise from the scrophulous nature of tubercular inflammation being so immediately connected with a debilitated state of the system, that every cause of debility, as we have seen, may excite it.—The same observations, both with respect to the causes and mode of treatment, apply to the more external inflammations of scrophulous habits. We are now to consider the means employed with a view to strengthen the system. This indication, as I have already had occasion to observe, applies chiefly to the more advanced periods of the disease. It is fulfilled by an attention to diet, exercise, and climate, and by the use of tonic medicines.

Physicians have always had in view the inflammatory nature of phthisis, although in many cases, particularly in advanced stages of the disease, it partakes very little of this nature. This has led them to pay too little attention to the general debility of the system, its most striking feature. Many observations seem to contradict certain rules, once received as established maxims, in the treatment of phthisis, and to demonstrate that a more invigorating plan than has generally been adopted is proper. Nor is this plan necessarily confined to the purulent stage. It sometimes happens, that even from a very early period the excite-

ment is inconsiderable and the pulse soft ; wherever this is the case the means of fulfilling the indication we are considering are applicable. Much harm has been done by the indiscriminate employment of a low diet, and other debilitating measures, in this disease.

In all cases of phthisis, perhaps, where there is little increased excitement, where the pain is inconsiderable and the pulse tolerably soft, the fullest diet which the patient's stomach will receive is the best. If it be found to increase the exacerbations, it will be easy to change it for a milder diet, but in such cases it will rarely be found to have this effect. In this diet a moderate use of wine is included. Here, as perhaps in all cases of chronic debility, the wine should be more or less diluted. When properly employed, such a diet, instead of increasing, relieves the pain, cough, and febrile exacerbations. In a treatise by Dr. May, the reader will find some cases in which the good effects of an invigorating diet are apparent. I have myself witnessed them in many instances, and have even seen the removal of what was supposed to be confirmed phthisis the consequence of it. In the purulent stage, in which every thing in general fails to remove the disease, it always gives more or less relief. If beef and mutton irritate too much for even these in many cases are not improper, the milder kinds of animal food should be chosen ; and although the patient should be restricted with respect to the quantity taken at one time, he may be allowed to take them frequently in the course of the day, avoiding them, however, in the evening, when they are most apt to increase the exacerbation.—While the excitement is considerable it is proper to study the patient's ease as much as possible. Exercise, therefore, should be avoided ; on this account it was not mentioned among the means of fulfilling the first indication. It makes an essential part of those employed with a view to strengthen the system.

Many of the observations made on sleep and exercise, in the section on the mode of treatment in the intervals of intermitting fever, are applicable to phthisical cases. I shall here make a few additional observations particularly applicable to these cases.

With regard to sleep, there is little to be added to what was said in the passage referred to. The cough sometimes prevents sleep, even when the patient is most inclined to it. While the excitement is considerable, the employment of opiates is in some degree a doubtful practice ; although it is seldom such as wholly to exclude their use combined with that of saline medicines. At other times they may be given more freely. They are the most certain means of allaying the cough, and thus doubly dispose to sleep. Wherever a full diet is judged proper, opiates may be used as freely as the state of the stomach will admit of.

I have already had occasion to make some observations on the manner in which opiates promote expectoration, by seeming at first to interrupt it. In the advanced state of the disease, opium tends to increase the sweats; but this effect can generally be counteracted by the use of astringents, and the relief they afford more than compensates for any tendency of this kind. I shall soon have occasion to consider more particularly the means employed for the purpose of relieving the cough.

With respect to the exercise of phthisical patients, what chiefly demands attention is, that it shall be such as may be continued for some length of time without fatigue. Gestation of various kinds, therefore, is preferable to any kind of exercise in which the muscles of the body alone are exerted. Much exercise of the muscles is also hurtful, by increasing the velocity of the circulation, and consequently the dyspnœa.

Some having observed the bad effects of fatigue, have proposed wholly to strike out exercise from the catalogue of remedies in this complaint, or only to recommend it during convalescence. A very extensive experience, however, of the effects of exercise in phthisis, as well as analogy, leads to a very different conclusion; and it is of much consequence to determine the kinds of exercise best suited to phthisical cases.

No exercise has been so celebrated in this complaint as riding on horseback, and Sydenham's authority has contributed to render it a general practice. Riding on horseback, he observes, provided it be continued for a sufficient length of time, is far preferable to every other exercise in phthisis; and he adds, what we have to lament experience has not confirmed, as it has many of Sydenham's observations, "*Sane haud multo certius cortex Peruvianus febris intermittenti, quam in hac ætate equitatio phthisi medetur.*" In other passages he speaks of it in language equally strong. He remarks, that in those who were cured of phthisis in this way, a tumor rose in the neck not very different from scrophulous tumors.

It is now pretty generally admitted, that neither riding on horseback, nor any other kind of exercise, can be regarded as any thing more than assistants in the cure of consumption. An indiscriminate use of any particular exercise in this complaint is improper; the degree and kind must be suited to the patient's strength. It sometimes happens, that riding on horseback increases the dyspnœa, and occasions pains in the breast. When it has these effects, or when it is attended with fatigue, it must be changed for more gentle exercise, and riding in a carriage is often beneficial. It frequently happens, that even this is too fatiguing. "All the modes of gestation," Dr. Cullen observes, "that are employed on land may fall short of the effects expected from them, because they cannot be rendered sufficiently con-

“stant, and therefore it is that sailing, of all modes of gestation, is the most effectual in pneumonic cases, as being both the smoothest and most constant.”

There has been much difference of opinion respecting the circumstances to which the benefit derived from sea voyages ought to be ascribed. Many, with Dr. Cullen, ascribe it to the constant and moderate exercise ; others, to the purity of the sea air, and the constant change of air. If the benefit derived from change of air, except it be to a purer air, or one different in temperature or moisture, ought to be ascribed to the occupation of the mind and cheerfulness occasioned by a constant variety of scene, as seems highly probable ; it is not likely that much is to be attributed to a change of air in sea voyages, unless the ship is bound to a more southern latitude.

Some have ascribed much of the good effects of sea voyages to the smell of the tar and rosin of the ship, and many to the sea sickness and vomiting. We shall afterwards find that vomiting excited by other means is sometimes beneficial. On the cases enumerated by Dr. Gilchrist, Dr. Reid, who attributes all the benefit of sea voyages in this complaint to the sickness and vomiting, observes, “The patients were generally sea sick, and vomited much bile ; and in some the good effects ceased when they grew familiar to the ship’s motion, and were no longer sea sick. He relates the case of a consumptive patient who went to sea three times, the distance ten leagues ; each time he was sick, vomited bile, and was cured of his disease. In the last, where the patient was at sea only five or six hours, the effects could not proceed from the air or exercise.” Dr. Carmichael Smith, on the other hand, in his treatise on the effects of swinging as a remedy in pulmonary consumption, observes, that if the benefit derived from sailing were owing to the sickness and vomiting it occasions, its good effects ought always to be in proportion to these. But this, he maintains, is so far from being the case, that he has seen the greatest benefit from sailing where the patients were either little or not at all affected with nausea and vomiting ; while, on the other hand, patients have been much affected with both during the whole time they were at sea, and yet neither the cough nor hectic fever abated.

Dr. Smith attributes the benefit derived from sailing merely to the motion, or what expresses his meaning more accurately, if I understand it, to the constant change of posture, both to one more or less bent, and from or towards the horizontal posture.

It is probable that the same circumstances in sailing may not be equally beneficial in every case. Their effects in all probability, in some degree depend on the cause of the disease ; a circumstance which seems to have been overlooked by those who have made observations on this subject, and to which their differ-

ence of opinion may partly at least be ascribed. In many cases it seems probable that the good effects of sailing are not to be ascribed to any one, but a combination of all its circumstances, particularly to that of the sickness and constant gentle exercise.

Swinging has been much recommended in phthysical cases by Dr. Carmichael Smith, who says, that during this exercise the cough is suspended, and the frequency of the pulse generally diminished, after the patient has been in the swing about ten minutes. And fourteen cases, he thinks, were cured by this remedy. The patient was generally in the swing from ten minutes to half an hour at a time. Others, however, have not met with the same success. "We are sorry to add," Dr. Duncan observes, after giving an account of Dr. Smith's treatise, in his Commentaries for the year 1788, "that from our own experience we cannot say much in favour of swinging. Since the publication of Dr. Smith's treatise we have had recourse to it in a considerable number of cases. In some few, where there were symptoms giving a presumption of phthisis, benefit seemed to arise from it; in others, though employed at a period when the symptoms were very slight, it had no influence either in checking the progress of this insidious disease, or in preventing its fatal conclusion. And, indeed, we have not met with any one case where phthisis had decidedly taken place, in which any material benefit arose from its employment. With some patients the sickness it occasions was so distressing, that they could not be prevailed upon to give it a proper trial; while with others it produced no obvious effect whatever, and particularly no change on the state of the pulse." The experience of others has probably been conformable to that of Dr. Duncan, as the remedy has not come into general use.

Of exercise in general it may be observed, that it is of great consequence to begin with that which may be used without fatigue, by degrees using a little of the stronger exercises as the strength will admit of.

With regard to climate, it has always been observed that phthysical patients are more or less relieved by the summer, their complaints generally increasing as the winter comes on, gradually becoming worse during the winter and spring, particularly the latter season. This, together with phthisis being rarer in warmer climates, suggested the propriety of sending those afflicted with this disease to such climates; and when the change has been made at an early period, it has often been successful. In most instances, however, it is delayed too long to be of any advantage.

The exhausting heats of sultry climates have not, for reasons sufficiently evident, been judged proper for phthysical patients. They are recommended to visit the mild climates of Madeira, Sicily, Italy, Spain, or the southern parts of France. Whatever

climate is preferred, as much uniformity of temperature as possible should be studied. Wearing flannel next the skin tends both to support the perspiration in cold weather, and to prevent sudden chills when the weather is warm. Nor are the sweatings in this disease, much, if at all, increased by this practice. The patient may be kept cold by having the rest of his clothes light, and (in warm climates) the flannel of a very thin texture. It also prevents the bad effects of damp linen next the skin; and every thing which tends to prevent catarrhal affections is of the first importance in the treatment of phthisis. It is particularly necessary, whatever the clothing be, to avoid any sudden exposure to cold and going into the night air.

We are now to consider the last means of fulfilling the indication before us, namely the use of strengthening remedies. Most of the articles of the *materia medica* which have been recommended in phthisis, have been employed as specifics. Those which deserve attention I shall afterwards have occasion to notice, and shall here confine myself to a few observations on such remedies as seem to act by strengthening the system in general; the bark, iron, cold bath, zink, and vitriolic acid. Among this class of medicines may be ranked most of the mineral waters recommended in phthisis.

It is not surprising in a complaint which has been so generally treated as merely inflammatory, that the use of the bark should have been very generally reprobated, especially as tubercles have by many been regarded as of the same nature with obstruction in the liver, spleen, &c. for the production of which it has, we have seen, erroneously been blamed. Many, Raulin, Desautel, &c. have for these or similar reasons, condemned the bark without a trial. Others have condemned it from having found it increase the exacerbations, anxiety, and dyspnœa. Even these writers, however, seem too hastily to have decided against the use of the bark in phthisis. It is true that these bad consequences often attend its use, but this is chiefly when the inflammatory tendency is considerable. When such are its effects, it ought to be immediately laid aside. The cases in which most benefit is to be expected from it are those in which the debility is great and the remissions well marked, so that the disease has more of the intermitting form than hectic fever generally assumes.

"In some cases," Dr. Cullen, who is no advocate for the use of the bark in phthisis, observes, "when the morning remissions of the fever were considerable and the noon exacerbations well marked, I have observed the Peruvian bark given in large quantities with the effect of stopping these exacerbations, and at the same time of relieving the whole of the phthysical symptoms: but in the cases in which I observed this, the fever shewed a constant tendency to return, and at length the phthysical symptoms also returned and proved quickly fatal."

In the first volume of the Medical Communications the reader will find cases of this kind more successfully treated with Peruvian bark by Dr. Samuel Chapman. It appears, however, that the use of the bark in phthisis is not to be confined to the foregoing cases; where the remissions were far from being very remarkable, the bark has been successful. Burserius speaks of its use in phthisis in the highest terms. Its wonderful virtue, he observes, is most remarkable in those who in their youth laboured under shrophulous swellings. I have already had occasion to observe, that in such exhausted habits the excitement is generally inconsiderable. The Peruvian bark has also been much praised where there is considerable admixture of blood in the sputa.— In such cases I have myself known it of great use. Upon the whole, experience seems to be wanting on this part of the subject; but from the trials which have been made, as well as from phthisis partaking so much of the nature of scrophula, in which the bark is often of great service, it seems to demand more attention than it has received from the practitioners of this country.

Less is to be expected from the use of iron in phthisis. It produces some of the effects of the bark, and is, perhaps, less apt to increase the oppression, dyspnœa, and febrile exacerbations. It has been chiefly recommended when the symptoms seem to arise from amenorrhœa, the constitution is relaxed, and the inflammatory symptoms very moderate, and in these cases it is generally combined with some gently stimulating medicine, particularly myrrh, of which and similar medicines I shall presently have occasion to speak.

Iron has been frequently employed in phthisis in the different mineral waters. Physicians, says Raulin, who have had most experience of pulmonary consumption, have recommended the use of ferruginous mineral waters in the earlier stages of this complaint. I have seen these waters, he adds, have good effects chiefly in the phthisis from tubercles. These cases were probably of the same nature with those in which Burserius recommends the bark. The reader will find, in a variety of authors, different mineral waters recommended in this complaint. In this country they seem to have lost their credit. It is most probable, indeed, that the change of scene, often of climate, and the amusements and regular exercise which frequently attend their use, have contributed to raise their reputation in this as well as many other complaints. In the generality of phthisical cases the ferruginous mineral waters are too stimulating, and on this account many practitioners have wholly condemned their use.

The cold bath has been recommended by Dr. Rush and others. If it is ever admissible, it is in the cases in which bark and steel are recommended. In these however, the debility is often such as to preclude its employment; and, upon the whole, most practitioners have been afraid to make a trial of so doubtful a remedy.

Zink has been much praised 'as a tonic, particularly by Dr. Percival, in phthysical cases. Of what service this remedy may prove, future experience must determine. Of the vitriolic acid I shall soon have occasion to speak, as a principal means of checking the tendency to sweat.

Such are the means of fulfilling the indications which regulate the practice in the different stages of phthisis. I am now to make some observations on certain specifics which have been recommended in this complaint.

I have already hinted, that emetics have been employed as a specific in phthisis.* From the debilitating effects of emetics we should a priori, suppose, that their frequent repetition must prove injurious in phthisis; yet even the daily use of them seems sometimes to have been found beneficial. How they operate it is difficult to say. "People at first," Dr. Reid observes, "are apt to be alarmed, fearing that by taking vomits every day the tone of their stomachs will be injured; but I can safely affirm, and I am warranted to do so by the best of all tests, experience, that I never saw any bad effects from a course of this kind continued for weeks with proper precautions; on the contrary, I have scarcely met with one instance where the general health was not essentially improved." In the earlier periods Dr. Reid sometimes used the antimonium tartarizatum, at other times ipecacuanha. The sulphate of zinc, as the most speedy and easy in its operation, is perhaps the best in this case. I have known this used daily for a considerable time with advantage.—Dr. Senter used the sulphate of copper with ipecacuanha.

Emetics seem best adapted to cases attended with considerable excitement, and consequently to the earlier stages of the disease; but respecting this part of the subject future observations must determine. It is not easy to believe that emetics can have any effect that will compensate for their debilitating tendency.

Since the days of Morton, who recommended a variety of balsams in phthisis, these have generally formed part of the treatment of the disease. Dr. Fothergill was among the first who opposed their use in phthisis, and they are at present falling into neglect in this country. Burserius and many others of the latest and best foreign writers still place much reliance on them. Van Swieten observes, that as balsams are very efficacious in curing external ulcers, physicians recommended them in the cure of ulcers of the lungs. The best physicians, he continues, use the native balsams; that of Mecca, for instance, Copaiva, and Peru, in preference to the artificial balsams so celebrated by the chymists. Boerhaave also condemns the latter, which have been called balsams of sulphur, and are prepared by dissolving sulphur

* See the observations of Dr. Reid and Dr. Fort Simmons on this complaint, a paper by Dr. Senter in the first volume of the Transactions of the College of Physicians at Philadelphia, &c.

in expressed or distilled oils. Many however, particularly the late writers of this country, regard them as equally useless or hurtful with the artificial. Sir John Pringle made a full trial of the balsams of Peru and Copaiva, and seems at first to have been prejudiced in their favour; yet he observes, that he has, since the former editions of his work, been so often disappointed in the effects of these balsams in phthisis, that he had wholly laid them aside. "The balsams, whether natural or artificial," says Dr. Cullen, "which have been so commonly advised in cases of phthisis, appear to me to have been proposed on no sufficient grounds, and to have proved commonly hurtful. Along with balsams of all kinds may be classed the various resinous gums, which have been recommended in phthisis, generally with the same view, and seldom with better effects." Dr. White, of York, speaks in still stronger terms, reprobating the balsams of Copaiva, Peru, Tolu, and Benjamin, turpentine, opobalsam, gum ammoniac, guaiacum, myrrh, storax, olibanum, and all their preparations.

The observations of these writers are, perhaps, too indiscriminating. We have reason to believe that in some debilitated and languid habits, medicines of this kind may occasionally be useful; I have myself made a trial of some of them, particularly of the storax combined with opium, with good effects. Dr. Fort Simmons warmly recommends the balsams of Copaiva and Peru; and Dr. Saunders and Dr. Percival speak highly of the effects of myrrh.*

* A young lady Dr. Percival observes, in the 2d vol. of his Essays, was, in the spring of 1785, affected with pulmonic complaints which threatened a phthisis. As they were accompanied with great languor and debility, he gave a solution of 12 grains of myrrh every six hours in a saline effervescent draught, marking the effect on the pulse with anxious attention.

"I shall transcribe from my notes," he continues, "only the first observation which I made, because each subsequent one was similar in result. April 20th, half past seven o'clock in the evening, pulse 120, feeble.—The draught administered. Ten minutes before eight, pulse 98, stronger and fuller. Half past eight, pulse 100. By perseverance in the use of this remedy and other auxiliary means, the young lady happily recovered."

"Myrrh," he observes in another place, "may very commodiously and with good effects be combined with nitre. I regard this remedy," he adds, "as the most useful which modern practice has adopted in consumptions." Others, however, have not met with the same success from the use of this remedy. Dr. Cullen says, that myrrh has not appeared to him to be of any service in phthisis, and in some cases to have proved hurtful. There is the same difference of opinion respecting the use of camphire. From this, perhaps, less is to be expected. Tar water is another remedy of this kind, which has been much celebrated. But the observations respecting it are not sufficiently accurate to enable us to form any certain judgment respecting its effects. One observation seems to apply to all this class of medicines, that wherever they heat and irritate, they do harm.

The truth seems to be, that physicians in quest of some specific that shall at all times remove the symptoms of this disease, have not in general been sufficiently attentive to adapt their remedies to the circumstances of the case, but have often used the same in all cases indiscriminately. The consequence of which has been, what might have been expected, the same remedy has done both good and harm.

Mercury has been recommended as a specific in phthisis, but in general with little success. Dr. Cullen says, that in many trials which he made with it, it proved of no service, and generally appeared to be manifestly hurtful. Dr. Ryan remarks, that although the remedy had never been employed in phthisis, its pernicious effects in other scrophulous cases would have left little hopes of its proving useful in this disease. The justice of this observation may be called in question. Modern practice has pointed out certain cases of scrophula, in which an alterative course of mercury is employed with much advantage.

"If there are any grounds," the author just mentioned observes, "for suspecting that the syphilitic virus is the cause of the disorder, then mercury is to be administered without further hesitation." If what was said when we were speaking of the causes of phthisis be just, the syphilitic virus never produces phthisis, except in those very rare cases in which a venereal ulcer spreads from the mouth to the trachea and lungs. If venereal complaints tend to produce phthisis only as they occasion general debility, as appears highly probable, the exhibition of mercury may even be more pernicious in these cases than where the debility is less. Mercury, indeed, has been chiefly employed in phthisis where the concurrence of syphilis rendered it necessary. And its effects in most of these cases have been such as to dissuade from the use of it where phthisis is the only disease. No means employed in phthisis better illustrate a remark just made on the impropriety of an indiscriminate use of any medicine in this disease. In the generality of cases the only effects of mercury would probably be that of hastening the fatal termination. Yet in one variety, I have, in repeated trials found it the best remedy, and have seen the patient saved by it almost in the last stage, after the purulent expectoration and hectic fever were completely formed; I allude to the cases occasioned by an enlarged and indurated state of the abdominal viscera. I have already had occasion to observe, that this cause of phthisis has been very generally overlooked, which is probably the reason that, as far as I recollect, no author has pointed out this variety of the disease as that in which mercury is useful.

I have also employed it with advantage in the incipient stage of phthisis, attended with a scrophulous affection of the lymphatic glands of the abdomen. There is reason to believe, I think,

that an alterative course of mercury may be of service in the removal of indolent tubercles.

From the effects of cicuta in resolving indolent swellings, even such as are evidently scrophulous, it has with much plausibility been recommended for dissolving tubercles. It has been so seldom employed in phthisis, however, that its effects are not ascertained. Dr. Cullen, in his lectures on the treatment of phthisis, we are informed by Dr. Ryan, used to recommend to his pupils a trial of the cicuta and coltsfoot when there was reason to suspect the presence of tubercles. He did not speak from any trials he had made, but thought it probable that these medicines might be of service. Coltsfoot has been employed for resolving scrophulous tumours; but, upon the whole, with little success.

Among the medicines of this kind may be mentioned the kali, which has not perhaps in phthisis met with all the attention it deserves.

I may refer to the works of Burserius and other foreign writers for a variety of specifics employed in this disease. Some of them are innocent, and this perhaps, is the most favourable account that can be given of them.

The lichen islandicus has been much celebrated.* After being steeped in water for some time, it is used as an article of diet in phthisis. I have repeatedly made a trial of it without any advantage.

The flesh and broth of vipers have ever since the days of Galen been a favourite remedy, and are even recommended in various cases by Mead, Morgagni, De Haen, and others. In this country their credit has only been established among the vulgar.

It is hardly worth while to mention among the specifics in phthisis the earth bath. It may, perhaps, seem strange, Van Swieten observes, that I should ascribe any peculiar efficacy in the cure of phthisis to the effluvia arising from the ground. But I have been informed, by a person highly deserving of credit, that through the whole kingdom of Grenada they attempt the cure of phthisis by an earth bath, and I have since read the same thing in the works of Francisco Solano de Luque, who declares that he used the earth bath with success even in cases deemed incurable. A hole is dug in the earth, and the patient put in, covered with earth up to the neck, and left there till he begins to shiver. As soon as he comes out he undergoes a general friction.†

* See observations on Pulmonary Consumption, and the use of the Lichen Islandicus in that Disease, by J. B. Regnault.

† The reader may also consult the end of Dr. Simmons's Treatise on Phthisis, where he will find some cases in which this remedy was employed.

In considering the different phlegmasiæ we found that certain medicines which tend to lessen the force and frequency of the pulse, have been found beneficial ; one of the chief of which is the digitalis, which seems often useful in the same way in the early stages of phthisis. I did not, however, mention this remedy among the means of relieving the inflammatory stage but referred it to be mentioned here as it has been recommended as a specific at all periods of the disease. But from every trial I have made with it I have reason to believe, that it is only beneficial in the inflammatory stage, and acts there in the same way as in other inflammatory complaints. It will at all times, indeed, diminish the frequency of the pulse, but after the purulent stage is completely formed, it seems never to produce any considerable or permanent good effects, and often by its debilitating tendency, to do harm. I give the result of my own experience with the more confidence because it agrees with that of many on whose judgment I rely.

The effects of a remedy which has lately demanded much of the attention of the medical world, seem in many respects analogous to those of the digitalis ; I mean an atmosphere in which the usual proportion of the oxygen has, by various means, been diminished. This too, which has been proposed as a remedy at all periods of the disease, is only useful, it would appear, by lessening the inflammatory tendency. In an early stage of phthisis we have reason to believe that it is beneficial ; and even after the purulent stage has commenced ; but while the pulse still retains a degree of hardness, any innocent means which obviate the inflammatory tendency are often of service. But, as in the case of digitalis, after the purulent stage is completely formed, anti-inflammatory measures are no longer proper, little or nothing is to be expected from it. This account of the effects of a lowered atmosphere in phthisis seems not only the result of experience in the disease, but is also supported by many of the experiments of the French and other chymists, from which it appears, that the oxygenous part of the atmosphere tends to support inflammation, and that breathing a pure oxygenous atmosphere will excite it.

It is needless to enter into any detail of certain ingenious opinions respecting the *modus operandi* of this remedy, and the supposed hyperoxygenation of the blood in phthisis. It is enough to say, that any person who, without prejudice, reviews the symptoms of the disease, will be satisfied that this hypothesis is as fallacious as, we have reason to believe, many of the modes of practice which have been founded on it.

If what has just been said be accurate, it reduces the value of a lowered atmosphere, as a remedy in phthisis, to very little ; since it is only to be classed among the means of lessening the inflammatory tendency, many of which are equally certain in their ef-

fects, and far more easy in their application. There is no indication in phthisis so easily answered as that of lessening the inflammatory tendency. At the same time it must be confessed, that further observations seem wanting fully to establish the truth of the foregoing remarks ; and whatever the result may be, society must feel itself indebted to those who are, by troublesome and tedious experiments, endeavouring to ascertain the value of a remedy which seemed at first to promise so much.*

May not lessening the quantity of oxygen in the air be of much importance in certain cases of pneumonia, where the usual means of relief have failed, or the patient's strength is too far reduced to admit of much venesection? And is there not reason to believe, that the application of oxygen gas to external ulcers in which the inflammation is too languid, may prove beneficial?

The only part of the treatment of phthisis which remains to be considered is that of certain symptoms which attend this disease, the particular treatment of which does not fall under the general indications of cure. The chief of these are coughing, suppressed or difficult expectoration, urgent dyspnœa, pains of various kinds in the thorax, vomiting, profuse sweats, and diarrhœa.

The most effectual means of relieving the cough, anodynes, I have already had occasion to mention. There are few cases of phthisis in which they may not, to a certain extent, be employed at every period. In advanced stages of the disease the excitement is never such as to render the exhibition of opiates a doubtful practice ; and the relief they afford renders them proper when there is no longer hopes of permanent advantage from any remedy.

Many other medicines have been recommended, with a view to relieve the cough in phthisis. The best of them consist of mucilaginous fluids, either prepared by decoction from vegetables, or by dissolving gum arabic or tragacanth in water. It was at one time customary to give very large quantities of such medicines. In modern practice they are, perhaps used too sparingly. They seem to serve a double purpose, that of besmearing the fauces, and that of lining as it were the stomach and bowels ; in both ways often preventing an irritation which excites the cough. For the former purpose they should be given in small and repeated doses ; for the latter they must be given in larger quantities. When given in very large quantity, however, they often oppress the stomach. This is particularly the case with the solution of the gums just mentioned. Of the decoctions none is better than water gruel or rice water, which ought always to form part of the diet in phthisis.

To the same head belongs a variety of the oily substances, the

* See the various publications of Dr. Beddoes on phthisis.

chief benefit derived from which seems to be merely that of besmearing the fauces. These are the most objectionable, as they are the most oppressive to the stomach of this class of remedies. They are never to be given in large doses, but I have found considerable advantage from combining small quantities of them, particularly of the spermaceti with the mucilaginous mixture used for the purpose of allaying the irritation in the fauces.

Such a mixture, with the addition of a small quantity of opium, appears to me the most powerful of all medicines for allaying the cough in phthisis. It should be kept near the patient, and about half a tea spoonful swallowed as often as the irritation which excites the cough is troublesome. Merely a bit of gum arabic or tragacanth kept in the mouth is often a means of preventing this irritation and is preferable to various kinds of sugar used for this purpose being both in general more effectual and less apt to oppress the stomach.

When the expectoration becomes difficult, and still more when it is wholly suppressed, there is danger of much increase of the symptoms. At an early period nauseating doses, particularly of the antimonium tartarisatum, are often the best means of restoring the expectoration and rendering it easy. At more advanced periods, especially when the temperature and strength of pulse are inconsiderable, the various preparations of squills and the fetid gums are often employed with advantage.

If the interruption of the expectoration depends on the increasing debility, the means which have been pointed out for restoring the strength will be the most likely to recall it.

If it arises, as sometimes happens, from a great degree of toughness in the matter to be expectorated, inhaling the vapour of warm water or gruel in which onions have been boiled is the best remedy. It has been recommended in all cases of difficult or scanty expectoration, to employ vapour impregnated with turpentine, the various balsams, gums, &c. But the irritating quality of vapour, thus impregnated, renders it a doubtful remedy.

Many of the foregoing means often allay the dyspnœa, at the same time that they restore the expectoration, and they may be occasionally used for this purpose when the expectoration is not suppressed, particularly the squills and gums when there is not much heat, and especially when the dyspnœa suddenly increases without any evident cause. When there is much heat and a dry skin antimonial medicines tend to obviate the irritating effect of the gums. These, combined with opiates, are very powerful in such cases both in relieving the dyspnœa and promoting the expectoration. In confirmed phthisis the skin is seldom long very hot and dry, and antimonial medicines are hardly ever proper, except in very small doses when the strength of the pulse is considerable during the evening exacerbations.

Many seem to think, that it is only as expectorants and anti-spasmodics that the gums ever prove useful in phthisis. We have seen reason to believe, however, that in certain cases, which might perhaps be better ascertained than they have been, these medicines are otherwise beneficial. For whatever purpose they are used, if they increase the heat and oppression, as I have already had occasion to observe, they will do harm. They generally have these effects, and consequently ought to be avoided when there is any considerable hardness in the pulse.

For allaying the cough and dyspnœa, and rendering the expectation easy, few means are so powerful as blistering, and it is generally proper either to support the discharge from the same blister for some time, by means of an irritating salve, or, what is generally more effectual and often less troublesome, to apply a succession of blisters. Blistering is a remedy of more general application in this complaint than any of those just mentioned. The excitement, even at the commencement of phthisis, being seldom such as to counterindicate their use. In supporting a discharge by blisters we must attend to the degree of strength, and not risk any considerable diminution of it.

Local blood-letting is also powerful in relieving the cough and dyspnœa, though not so much so as blisters. The excitement, except at an early period, is seldom such as to render it necessary. Local blood-letting is more powerful in relieving the pain of the chest, and when it is severe and the excitement such as warrants the use of this remedy, a small loss of blood from the skin, as near to the pained part as possible, is often advisable. But the effect of blistering, even in relieving the pain, is frequently as speedy, and, for the most part, more permanent than that of blood-letting; so that, except where the pulse is hard, especially as it is a safer remedy, it is generally to be preferred. When the pain is very severe, a combination of these remedies is proper.

Nothing is more pernicious in complaints of debility, than continued vomiting. I have more than once had occasion to point out the means of allaying this symptom. The saline draughts where the skin is dry, or a mixture of the vitriolic acid, conserve of roses, and peppermint water, when the tendency to sweat is considerable, will often prevent vomiting. If it resists such means, a dose of solid opium, or opium combined with camphor and castor, will generally be found effectual. But vomiting in phthisis is, for the most part, the consequence of violent coughing, and is therefore removed by the means which alleviate this symptom. In obstinate vomiting it is often proper to excite the action of the intestines by cathartic clysters, but in a disease of such debility they must not frequently be had recourse to; and in the latter stages the danger of diarrhœa wholly precludes the employment of such means.

There is no symptom which more rapidly reduces the strength, and which consequently it is more necessary to check, than the sweating that so generally attends the more advanced stages of phthisis. The various means which tend to restore the strength, tend at the same time to check this symptom. Dr. Percival observes, that a biscuit steeped in wine, a draught of wine, or a dose of the solution of myrrh, often succeeds in checking the sweat. Lime water has been much celebrated for this purpose. The reader will find it recommended by Sir John Pringle, Burserius, and others ; but there is no medicine of equal efficacy with the vitriolic acid, which rarely fails to lessen, and often wholly checks the sweating. Some maintain that it ought not to be wholly checked ; but this opinion seems to be the result of hypothesis. The relief which the sweating brings is never complete and always transitory, and the harm which it does is certain. Checking the sweat, it has been said, tends to bring on the diarrhœa ; and there may be some truth in this observation ; but we gain little by preventing the diarrhœa at the expense of the constant recurrence of the sweating. Both are to be checked, as their tendency is equally pernicious.

Van Swieten observes, that opium is almost the only thing which brings effectual relief in the colliquative diarrhœa of phthisis and when it is accompanied with griping pains and tenesmus, he directed it to be injected with other medicines by clyster. "Rhubarb," Dr. Cullen observes, "so commonly prescribed in every diarrhœa, and all other purgatives, are extremely dangerous in the colliquative diarrhœa of hectic. Fresh subacid fruits, supposed to be always laxative, are often in the diarrhœa of hectic, by their antiseptic quality, very useful." Dr. White recommends the colomba. and refers to a treatise of Dr. Percival on this medicine, in which are several cases where it checked obstinate vomiting and purging when other means had failed.

As the colliquative diarrhœa is the effect of debility, I have followed those who have trusted chiefly to simple astringents alone or combined with opium, generally employing either the kino or extract of logwood, and have always found them more or less successful, till at length the powers of life gradually declining, all medicines lose their effect. Whatever other means we employ, some mucilaginous fluid is proper for the purpose of allaying irritation. It may be observed of the diarrhœa, as of the sweating, that all means of strengthening the system in general will be found useful in checking it.

The menstrual discharge we have seen, always sooner or later ceases in phthisis. This alarms the patient, and when it happens at an early period the whole complaint is generally attributed to it. The physician knows that it is merely a

symptom of increasing debility, that it is in vain to use any direct means to restore its regular returns, and that could it be restored, its only effects would probably be, that of increasing the debility and hurrying on the fatal termination.

It is hardly necessary to add, that avoiding all the exciting causes forms an essential part of the treatment of a disease whose causes are so numerous and frequently applied; for it appears, from what was said of the causes of phthisis, that every thing which tends to diminish the strength or irritate the lungs may be ranked among them.

BOOK III.

OF THE PROFLUVIA.

ONLY one order of diseases remains to be considered, the Profluvia, the definition of which was given in the general introduction, namely,

Symptomatic fever, in which the local affection is an increase of some colourless secretion.

Under this order, Dr. Cullen arranges only two diseases, Catarrh and Dysentery. If any others have a title to be classed with them they are the Cholera and Diabetes. But these are so frequently unaccompanied by fever, at least through a great part of their course, and often indeed through the whole of it when they terminate favourably, that they have not been regarded as febrile diseases.

Of the two diseases arranged by Dr. Cullen under this order, I have in the preface to this volume* given my reasons for considering only the dysentery here.

CHAP. I.

Of Dysentery.

DYSFNTERY is defined by Dr. Cullen,

A contagious fever, with frequent mucous or bloody stools. The natural fæces, for the most part, being retained with griping and tenesmus.

As the contagious nature of dysentery is not always remarkable, and the symptoms mentioned in the definition serve sufficiently to distinguish it, this part of the definition might with propriety be omitted.

Dr. Cullen agrees with Sir John Pringle in admitting but one species of idiopathic dysentery, regarding the circumstances which have been looked upon as marking different species of the complaint as merely accidental ; such as the presence of worms ; the discharge by stool of fleshy or sebacious substances, there being no discharge of blood ; the appearance of miliary eruption, &c. There would be no end it is evident to species of this kind.

* See Appendix I.

SECT. I.

Of the Symptoms of Dysentery.

THIS disease sometimes comes on with the usual symptoms of fever, shivering, and the other marks of a cold stage, which are soon succeeded by heat and thirst, and in a short time after by the symptoms peculiar to dysentery.

It more frequently happens, however, that an affection of the bowels is the first symptom. In many cases the disease comes on with a common diarrhœa, which gradually assumes the form of dysentery. In other cases there are from the first, severe griping, tenesmus, and bloody and mucous stools. The febrile symptoms soon shew themselves, and there is often a very sudden prostration of strength.

The disease often makes its attack very gradually, wandering pains of the bowels distressing the patient for several days before dysenteric symptoms shew themselves, and the fever frequently does not make its appearance till some time after this happens. It is sometimes a synocha throughout the greater part of its course, more frequently a typhus and in some cases it is a well marked typhus from the first. When this last happens, the danger is very great ; we must expect all the symptoms of a putrid fever, aggravated by those of dysentery.

In the worst cases the disease sometimes proves fatal in a few days, during which, the patient is reduced to the last stage of debility. If he survives many days, the emaciation is extreme, equal to what we observe in phthisis. In more favourable cases, the debility comes on less suddenly.

As the disease often begins with diarrhœa, in a large proportion of cases the favourable change is denoted by the return of this symptom, the griping and tenesmus abating or wholly disappearing. The diarrhœa generally soon leaves the patient with no other complaint than a degree of languor and debility proportioned to the severity of the preceding disease.

In other cases, the hardened fæces, which are either wholly retained during the complaint, or partially excreted in small hard masses, are at length discharged. The dysenteric symptoms abate, and the patient gradually recovers.

The duration of dysentery is various ; the mildest, like the more severe forms, sometimes run their course in a few days, or at most weeks. Those in which the symptoms are obstinate without being severe, are often protracted for many months.

Such is the general course of this disease. In speaking of its

symptoms in detail, after mentioning the ways in which it makes its attack. I shall give the progress of the local symptoms denoting the peculiar affection of the bowels ; then, that of the general symptoms which accompany these ; and lastly, mention the different ways in which the complaint terminates. either in death or recovery. Before proceeding farther I may observe. by the bye, that as the fever in dysentery is not only sometimes the first part of the disease which shews itself. but even now and then continues for some time before the local symptoms appear, and as the degree of fever often seems proportioned rather to some peculiar virulence of the contagion, than to the degree of the local affection, it may seem, that the fever in dysentery is regarded as symptomatic of the local affection with less propriety than other symptomatic fevers. But it appears from a variety of facts, that the contagion of dysentery, or the putrid effluvia attending it, may excite a real typhus independently of any local affection, in which the latter frequently does not appear for some time after the commencement of the fever, and in some cases does not appear at all. Where such a fever, therefore, continues for some time before the local affection shews itself, the case is evidently to be regarded as a complication of typhus and dysentery. In the case of simple dysentery we shall find sufficient proof of the general affection depending on the local, the former being constantly influenced both with respect to kind and degree by the state of the latter, ceasing along with it, even when removed merely by local means, and again returning if it be renewed by errors of diet, or any other cause affecting the intestines.

When dysentery makes its attack suddenly, it often comes on with great prostration of strength. attended with nausea and vomiting, and a weak and frequent pulse. The prognosis is then generally bad.

More frequently dysentery comes on with milder symptoms. The patient is seized with rigors, and the other symptoms which attend the commencement of fever, and in a short time the affection of the bowels shews itself with pain. and mucous and bloody stools. The pain is generally of the griping kind, but is very various in different cases, and indeed at different times in the same case.*

* "Some," Dr. Cleghorn observes, "are seized with a twisting of the guts, which, as they express it, draws up their bowels into knots, and many, instead of griping pains which shift from place to place and come at intervals, have acute fixed ones in some particular part of the belly, which occasion complaints as various as their seat, some being attended with stitches about the bastard ribs, interrupting their breathing freely, as in the pleurisy; others with a pain reaching from one hypochondrium to the other, cutting them, as it were. in two, while others complain only of a pain about the pelvis, with a constant fruitless straining to stool, though the body is for the most part costive, and discharges nothing but bloody slime."

It is sometimes preceded, even for days, by various symptoms denoting derangement in the stomach and bowels, flatulence, acid eructations, costiveness, &c.

Sometimes. I have just had occasion to observe, dysentery is preceded by common diarrhœa. By irritating the intestines and washing off the mucus from them, this symptom seems frequently to occasion the dysentery. The desire to go to stool gradually becomes more frequent; the griping and tenesmus more severe; the matter voided is gradually changed, and at length consists wholly of a small quantity of mucus mixed with blood.

The quantity of blood in the stools is very various. Sometimes it is only in streaks; sometimes it forms a considerable part of the stool, and sometimes almost the whole. So that, were it not for the other symptoms, the complaint might be mistaken for the hæmorrhoids. It is from the large quantity of blood sometimes discharged, that the complaint has been called the bloody flux, not very properly, however, since this symptom attends other diseases, and in many cases of dysentery the stools are un-mixed with blood. The disease has then been termed dysenteria alba, or morbus mucosus, and esteemed a different species from the common dysentery, but very inaccurately, since in different cases the quantity of blood passed, varies from a very considerable, to the least possible quantity.

The natural fæces are often retained during almost the whole course of the complaint, and when they do appear, they are in the form of scybalæ, that is, small separate balls which seem to have lain long in the cells of the colon. The excretion of these, whether spontaneous or by medicine, is attended with a remission of the symptoms, particularly of the frequency of the stools, griping, and tenesmus.

Such are the appearances of the stools in all cases of dysentery. Sydenham, indeed, mentions cases under the name of dysentery, in which there were no stools. They cannot, however, be regarded as dysentery, since the stools may be looked upon as the chief characteristic of this disease.

In many instances there are particular appearances in the stools not essential to the disease. Among the most frequent of these, are small masses of a fatty looking substance, concerning the nature of which, there is some difference of opinion.*

* "As to the white substances," Sir John Pringle observes, "which I compare to suet, I do not know whether they are the same which Hippocrates calls *σάχνες* (carunculæ) but they are plainly described by Aretæus and Cælius Aurelianus, and have since been taken notice of by later writers, under the name of corpora pingui, and variously accounted for. Although I have frequently seen them, I had neglected to examine them till the autumn of 1762, when Dr. Huxley and I visited a patient ill of dysentery, who voided such substances. We preserved one of them,

Membranaceous substances are a common appearance in dysenteric stools, and have been regarded as small portions of the internal coat of the intestines abraded ; but Zimmerman observes, that the fibres and membranes that come away in dysentery, and are considered as the inner coat of the intestines, are very seldom any part of it, but often nothing else than inspissated mucus, which is sometimes excreted also, under the appearance of a fleshy, membranous, or fatty body, in cases where no ulcer of the bowels was to be perceived on dissection. He admits, however, that the villous coat of the intestines is sometimes abraded and passed by stool. The bowels, he observes, are sometimes ulcerated, but so late in the disease that the membranous matter is changed into a putrid thin pus, or is so mixed with blood and mucus that it is impossible to distinguish it ; so that there cannot be a greater mistake, he adds, than to suppose the fibrous and membranous substances passed often in the first days of the disease to be parts of the internal coat of the intestines and signs of ulceration.

It is not uncommon in dysentery for worms to be passed by stool, or even by vomiting.*

The consistence of the stools is various. The mucus is generally mixed with a watery fluid, and is often frothy ; as the disease advances, the stools sometimes become sinious, and of a dark brown or black colour, with an insupportable cadaverous fetor. This change in the appearance of the stools affords a very bad prognosis and often, indeed, indicates the presence of gangrene. At an early period the stools have often little or no fetor, but a faintish disagreeable smell.

By an attention to the local symptoms of dysentery we may sometimes determine what part of the intestines is affected. If the small intestines be the seat of the disease, the pain is often very acute, and the patient complains of its twisting round the umbilicus. The sickness and vomiting, and the pain and flatulence of the stomach, are more urgent than when the disease is

“ and were both satisfied that the object of our inquiry was nothing but a bit of cheese, though the patient assured us afterwards he had tasted none from the beginning of his illness, which had been of above a fortnight’s standing.” Sir John Pringle concludes, that they originated either in bits of cheese which had passed from the stomach before the illness, or were formed from milk, the use of which the patient had continued. We shall presently find Zimmerman giving a different account of these substances. It is more than probable that they are not the *σάγνες* of Hippocrates, since Degner and other writers mention both these fatty substances and small fleshy bodies which they term *carunculae*. Other similar appearances are met with in the stools. All of these substances have sometimes been rejected by vomiting.

* In 1743 we are informed by Huxham that a dreadful dysentery raged, in which worms were passed even by adults and old people. Pringle, Monro, and others, mention worms thrown out by vomiting.

confined to the large intestines, the fæces are not passed immediately after the griping, and the blood is mixed intimately with the other parts of the stool.

Hiccup sometimes supervenes early without affording a bad prognosis, which it always does when it comes on at a late period and when the other symptoms wear an unfavourable aspect. When hiccup appears early and proves obstinate, it may be suspected, that in whatever part of the intestines the complaint is seated, it is pretty high in the abdomen.

When it has its seat in the large intestines, the pain, according to Bursarius, is more obtuse. But Sir John Pringle remarks, that in general the irritation of the stomach and higher intestines is attended with more sickness than griping, and that when the gripes are very acute without sickness, it is probable that the disease is in the large intestines. When the seat of the complaint is in these, the tenesmus is most urgent, the stools more quickly follow the griping, and the blood and purulent matter, if there be any, is less mixed with the rest of the excrement.

Sometimes both the large and small intestines partake of the disease. This circumstance, together with the intestines constantly changing their place, the sympathy which subsists between different parts of them, and their being in some measure differently situated in different people, often renders it very difficult to determine with any certainty the seat of the disease.

The matter rejected by vomiting in dysentery is frequently bilious and sometimes, though rarely, stercoracious.*

The flatulence of the stomach, and bowels sometimes goes so far as to produce a real tympanites intestinalis.

The tongue and fauces partake of the general disorder of the alimentary canal. The mouth is foul, the patient complaining of a bitter taste; the tongue white and covered with tough mucus, or rough and dry, at length becoming black. Aphthæ frequently appear about the root of the tongue, and sometimes spread over the whole internal fauces. When we were considering eruptive fevers, I had occasion, in more than one instance, to observe how much the eruption was influenced by the state of the stomach and bowels. It even appeared that disorders of the alimentary canal are not unfrequently its exciting cause. We have reason to believe, that it is on this account that dysentery is so frequently accompanied by eruptions of various kinds. The miliar eruption is frequent in this disease. There is sometimes an eruption of large red pustules running to suppuration.†

* See the observations of Degner and some others.

† Degner describes a singular eruption which appeared in one of his patients, blotches and hard black tubercles, like the true pestilential carbuncles, which terminated in a fatal sphacelus.

There are cases of dysentery unattended by fever. In these, however, the affection of the bowels is slight and of short duration. In many cases, we have seen, the fever is a synocha. This is particularly the case in the young and robust, and in those cases in which the disease is produced by the use of fermented liquors, strong food, or other causes which accelerate the circulation.

When the excitement runs high, the danger is considerable, the debility which succeeds being generally proportioned to it. In the worst cases there is but little excitement, and even syncope occurs at an early period. It sometimes happens, that the pulse is natural for the first days, and the disease notwithstanding proves dangerous, especially where the strength is much reduced. About the third or fourth day the pulse becomes frequent and often very suddenly begins to intermit.

The state of the various functions is the same as in simple fever, except where they are influenced by the local affection. There is often a painful strangury from the commencement of the disease, and the urine is sometimes wholly suppressed for several days.

The fever in dysentery is not always continued; it sometimes assumes the tertian type, and in many cases remits irregularly. Considerable remissions, and still more intermissions of either the local or general symptoms, are favourable. They can only be depended on, however, when they have lasted for some time. As the fatal termination approaches, symptoms of extreme debility gradually shew themselves. A lenteric purging often comes on, whatever is taken being passed with little change; the pulse becomes extremely frequent, small, and irregular; the skin bedewed with cold, clammy, and partial sweats; the extremities become cold, and the pulse at length ceases. It sometimes happens, that after these symptoms the patient lives for several days, the pulse and natural heat gradually returning; but these, for the most part, are deceitful appearances. The pain and even tenesmus remit, but the anxiety and restlessness increase, with dark coloured and extremely offensive stools, the face becoming hippocratic. We are then assured that gangrene has taken place, and will speedily prove fatal. It is not uncommon here, as in gangrene of the intestines from other causes, for the patient to retain his senses to the last.

We may look for a favourable termination, when the febrile symptoms are mild, some degree of appetite remains, and the patient is little troubled with nausea; when the pains are not very severe, nor the stools very fetid, and the emaciation, weakness, and anxiety inconsiderable; and above all, when the patient enjoys sleep, and the skin is soft and moist. The favourable diarrhoea, in which dysentery often terminates, like that which pre-

ceeds death, is sometimes lienteric, though seldom in the same degree.

Dysentery rarely terminates in recovery in so short a time as it sometimes proves fatal ; seldom in less than twelve or fourteen days. Protracted cases may prove fatal either by the symptoms suddenly increasing, or in consequence of the strength being gradually exhausted. But in such cases the symptoms are generally milder than in those which run their course more rapidly, and the danger consequently is less. The bowels seem sometimes to acquire a habit (if the expression may be used) of retaining the fæces, and the disease is protracted even for years, the patient being constantly harrassed with pain, mucous stools, fever, and want of appetite, under which he gradually sinks. In such cases some part of the intestines is often ulcerated.

The lower parts of the intestines are generally the last that recover their tone ; the tenesmus often remaining a considerable time after all the other symptoms have disappeared. This has been ascribed to the remains of the morbid matter ; but Sir John Pringle seems to ascribe it to the true cause, the soreness of a part which has been so much inflamed and excoriated in the course of the disease, and which is still frequently irritated. "That the tenesmus which succeeds dysentery," he adds, "may be sometimes owing to an ulcer, is asserted by Morgagni, but he gives only one instance of it in his practice."

Various diseases of debility, particularly of the stomach and intestines, have followed dysentery, especially when long protracted, obstinate diarrhœa, or lientery, dyspepsia, and pains of the bowels. Degner says, that some of his patients after recovering from the dysentery had a discharge of chyle with the fæces ; and others almost an insatiable hunger. Permanent stricture of the intestines, particularly of the rectum, as I have myself known, may be induced by long irritation from acrid stools. If the patient is much reduced by dysentery, dropsical symptoms often succeed, which are sometimes removed by tonic medicines and a proper attention to diet and exercise.

SECT. II.

Of the Appearances on Dissection.

ON opening the abdomen of those who die of dysentery, we generally find the intestines inflamed, more or less sphacelated, and sometimes ulcerated. Sometimes they are of a dark colour, almost black indeed, for a great part of their course without ulceration.

It is not uncommon to find traces of inflammation throughout

almost the whole track of the intestines, and even spreading into the stomach, which in many cases partakes of the gangrene.

The coats of the intestines are often much thickened, and here and there tender, as if half putrid.

The villous coat is frequently abraded, though not so often as once supposed; sometimes it seems quite dissolved into a greenish putrid mass. When the villous coat is consumed, the vascular generally appears full of turgid vessels, as if well injected with red wax.

The internal surface of the intestines is often covered with bloody slime of an extremely offensive smell, and sometimes there is no excrementitious matter, either in the form of scybala or any other in any part of them; the digestive powers seeming to have been wholly interrupted for some time before death.

The large intestines are more frequently affected with gangrene and ulceration than the small. Wherever much blood is passed by stool, we should expect to find the intestines ulcerated; it does not appear, however, that this is always the case. Blood is frequently passed in considerable quantity when no appearance of ulceration can be found after death; so that Sir John Pringle and Zimmerman conclude, that in general the blood flows from the debilitated mouths of the vessels which open on the internal coat of the intestines; and the gangrenous state of this coat often extending so far along the canal without actual ulceration, favours the opinion.

The great quantity of flatus frequently collected in the intestines in this disease, distends them beyond their usual size. From this cause, together with the flaccidity occasioned by the gangrenous state of the intestine, the colon in particular has often been found prodigiously enlarged, the appearance of its cells, and even of the ligaments which form them, being almost wholly obliterated. The ligaments are sometimes found corrupted and adhering loosely to the outer coat of the intestine.

When gangrene has not destroyed the texture of the parts, constrictions are found, particularly in the large intestines, often of considerable extent. These are supposed by the generality of writers to be the cause of dysentery, by retaining the natural faeces, which, by lying in the intestine, are formed into hard masses, occasioning much irritation, and are thus probably at least one cause of the copious secretion of mucus in this disease. It is not to be overlooked, however, that the irritated state of the bowels may often occasion constrictions in the course of the disease, which will not fail to aggravate its symptoms. The relaxation of these constrictions readily accounts for the highly offensive and putrid stools which are so often the forerunner of death.

Sir John Pringle, Dr. Cleghorn, and some others, mention an appearance in the intestines of dysenteric patients, which seems to have been generally overlooked, since it would seem from their observations that it is not rare, that of flat tubercles, which look like the confluent small-pox.* Such are the appearances observed

* "The Dissector," the former observes, "having cleared away the blood and mucus from the inside of the cæcum, and of the colon and upper part of the rectum, made us take notice of certain protuberances of a lighter colour than the rest of the surface. They were of a roundish figure, nearly equal in their height, which was about the twelfth part of an inch, but of unequal breadth. We all agreed that we had never seen any thing so nearly resembling the small-pox of a flat sort at the height of the disease. These excrescences stood as thick on this part of the intestines as variculous pustules, when numerous, do upon the skin, but different from them in this, that as far as we examined them they were of a firm consistence without any cavity. Mr. Hewson told us that he believed they took their rise from the cellular membrane, which lies immediately above the villous coat; for that some days before, having opened another person who had likewise died of the dysentery, he had found the appearances much the same as in this subject, and particularly with regard to these tubercles, which he had examined at leisure. These protuberances, he observes a little lower, were only in the larger intestines; for though we likewise opened the smaller, we could observe nothing similar to them there." Sir John Pringle thinks that it is probable that they might have been seen in the other subjects he examined, had they been more narrowly inspected. "Linnæus," he observes, "in treating of the bloody flux, says, that in the epidemic dysentery there is an internal scabiness of the intestines, as appears from the dissections of the bodies which die of this complaint. And Mr. Cleghorn," he remarks in another place, "who had frequent opportunities at Minorca, of seeing the epidemic dysentery, observes, that on opening the bodies, he constantly found the great guts either entirely mortified, or partly inflamed and partly mortified; that the rectum was mostly affected, and that in many he had seen schirrous tubercles straitening the cavity of the colon in several places. Now though these tubercles, which I describe in my patients, were too flat to be taken notice of as straitening the cavity, yet in Mr. Hewson's preparation they were perhaps protuberant enough to have had that effect. On the other hand it may be remarked, that such protuberances are scarcely mentioned in the *Sepluchrotum* of Bonetus, or in Morgagni's valuable Supplement; but the silence about them in these two works is perhaps no proof against their frequently existing, when we consider that in Bonetus we have but a few cases, and those but imperfectly delivered, of those who died of an epidemic flux, and in Morgagni, of that sort none at all, his cases being all of the sporadic kind, as he generally declined opening the bodies of those who died of any infectious distemper." Similar appearances have been noticed by some later writers. Zimmerman's account of them is in some measure different from the foregoing. In the *intestina crassa*, he observes, there were little aphthæ that bled when pressed and looked like the flat kind of small-pox when this disorder is at the height, but with this difference, that they were without any cavity. They consisted of the two innermost coats of the intestines, that grew one within the other, and were thickened by the inflammation. The first of these was covered by a black mucus, and black spots were likewise visible on it. Sometimes the mesenteric glands were swelled, relaxed, filled with a bad kind of pus, and very nearly mortified. Zimmerman also observes,

in the intestines of those who die of dysentery. Dr. Cleghorn informs us that in some cases which he saw, the ulcers were not on their internal but external surface. In a few, he observes, there were small abscesses in the cellular membrane of the peritoneum, contiguous to the colon and rectum; the convolutions of the intestines frequently adhering to each other, or to parts in their neighbourhood.

With regard to the other viscera of the abdomen, they are often sound. The mesentery and mesocolon, even when the intestines are gangrenous, are sometimes loaded with fat. Dr. Cleghorn observes, that in two cases which he saw, the omentum was almost entirely wasted, the small remains of it being quite black, while purulent matter was found in the abdomen. The gall bladder is often much distended with bile, which is generally of a darker colour than usual. The liver, spleen, pancreas, and kidneys are sometimes flaccid and enlarged, sometimes, though more rarely, they are diminished in size and indurated. In some cases they have been found gangrenous or consumed with abscesses.

The following description forms a striking picture of the effects of this disease. "Although the body was opened the next day, the smell was intolerable, the intestines were wholly mortified; and the stomach partly so. The coat of the liver was putrid, and in its substance were several abscesses containing a purulent or ichorous matter; the spleen was likewise corrupted."

There is seldom much change to be observed in the thoracic viscera. The author just quoted mentions a case in which the diaphragm ascended as high as the third rib, probably from the distention of the abdomen, yet the lungs were sound. In the 31st Epistle of Morgagni, indeed, a case of dysentery is related, in which the lungs were found in a very diseased state. The blood is generally of a dark colour, and partly coagulated in the ventricles of the heart.

From the above state of the abdominal viscera,† we have reason to believe, that death is generally occasioned by inflammation and gangrene of the intestines. When the pulse is frequent and small, and the pain severe, with much tenderness of the abdomen and nausea, we may be assured that inflammation of the intestines has supervened.

that small pustules have sometimes been seen in the bowels, which come away even during the patient's life, and are full of a putrid and very offensive matter.

* Sir John Pringle's observations on the diseases of the Army.

† See Roederer de Morbo Mucoso, p. 155 et-seq.

SECT. III.

Of the Causes of Dysentery.

THE ancients were acquainted with dysentery, but most of them used the word in a very vague sense; Hippocrates, Galen, and many others, applying it as a general term for all kinds of fluxes or hemorrhagies of the intestines; others confining it to express an ulcer of some part of the alimentary canal.* Sydenham and Willis seem to be the first who confined the term to the disease we are considering.

Dysentery is more a disease of the warm than the cold and temperate climates, and most frequently appears towards the end of summer and in autumn. Huxham is among the few writers who met with an epidemic dysentery in spring. It has been observed most apt to make its appearance when the summer is unusually warm and the autumn moist; and the coming on of the winter cold is generally a chief means of checking its progress. These observations, however, are not universally applicable. for dysentery has sometimes made its appearance, and proved very fatal after moderate heats, and sometimes it has continued through a great part of the winter.

Weak and exhausted habits are most liable to this disease. This observation is most applicable to the worst forms of dysentery, which partake so much of the putrid fever, that Dr. Blane looks upon the disease as merely a fever of this kind, regarding the affection of the bowels as only symptomatic.

With regard to the occasional causes of dysentery, many maintain that there is but one, contagion; and that the other supposed occasional causes of this disease only favour its operation.* I shall make a few observations on the contagion of dysentery, and afterwards on the other circumstances which have been supposed capable of exciting this disease.

Of contagion in general I have already had occasion to speak at length; it will only be necessary to make a few additional observations, particularly applicable to the disease before us. The dysentery is now very generally admitted, in many cases at least, to be contagious; so that it is unnecessary to quote observations

* If this be just, many of the circumstances I am about to mention should be regarded merely as predisposing causes; as however it is probable (as will appear from what I am about to say) that they act also as occasional causes, I refer them to the latter head. It is to be recollected, as I have already had occasion to point out, that even in the most contagious diseases, the contagion itself sometimes acts merely as a predisposing cause.

in support of this opinion. The contagion of this disease, like that of most others, extends but a short way around the sick. But its chief source is the excrement; for the mere smell of it, as Zimmerman observes, has often communicated the disease to men in health, and even to beasts. And it would seem, that the more fetid the excrement, the more contagious is the disease. It may be propagated, the author just mentioned thinks, by clothes or furniture which have never been in contact with the sick, provided they have been exposed to the effluvia arising from the patient's body, and still more to those arising from the excrement; and, as I have had occasion to observe of other diseases, the person who wears the infected clothes may escape, while the disease is communicated to those with whom he has intercourse. It is a remark of Sir John Pringle, however, that the contagion of dysentery spreads more slowly, and is of a less infectious nature, than most others; so that in the milder epidemics, as in that described by Sydenham and Willis, its contagious nature has passed unnoticed. This observation by no means applies to the worst forms of it. Degner and others mention epidemics not less infectious than the plague itself. Like many other contagious diseases, it is often communicated to the fœtus in utero.

The manner in which dysentery is propagated points out some of the chief means of checking its progress. Public privies are the most certain means of spreading this distemper. It is not even proper to confine the sick to the same privies, as the constant application of the contagion not only renders the disease more dangerous to the patient himself, but to all that are near him, by rendering it more infectious. The excrement of the sick should be regularly buried. By this means, and carefully preventing all intercourse between the healthy and diseased, the spreading of the disorder might in a great measure be prevented, even in camps where it often proves so fatal. The attention should be particularly directed to detecting the diseased, who use every means to conceal a disorder which will exclude them from the comforts of society, and seldom betake themselves to bed till they have infected many of their companions. But for the various means of preventing the spreading of this, as well as other contagious diseases, I refer the reader to the first volume.*

In endeavouring to prevent the spreading of the contagion, it is particularly necessary as much as possible to avoid the other

* A vomit and gentle cathartic, Zimmerman remarks, seem often to prevent the disease in those who are exposed to its contagion. Those, it has been observed, who eat little, drink less, and do not take their drink cold, who keep up the perspiration, especially during the night, by covering themselves all over with the bed clothes, either escape the disease, or have it slightly. Fatigue, vexation, and fear dispose to dysentery as well as other contagious diseases. There is every reason to believe, that tonic medicines, by strengthening the alimentary canal, tend to prevent dysentery. See Sir G. Baker de Dysentery.

causes of dysentery. If they are not capable of exciting the disease, independently of contagion, they certainly add to its power. The chief of these causes are. bad diet ; the presence of much bile, or other irritating matter, in the stomach and intestines ; cold ; and, above all, putrid effluvia.

The habit of body induced by a bad diet never fails to aggravate the symptoms of this disease, and seems to be one of the chief causes of the greater virulence of dysentery among the lower ranks. The same observation applies to a debilitated habit, however induced. I have had opportunities of pointing out how much the severity of other contagious diseases is increased by it.

Many have been led wholly to ascribe dysentery to a superabundance of the bile, from the stools in this complaint being so frequently bilious ; from an unusual quantity of bile being often found in the intestines and gall bladder of those who die of it, and that generally of a dark colour. implying a vitiated state of this fluid ; and from dysentery prevailing most in those countries where a vitiated secretion of bile is most common. A very slight admixture of bile, however, will often give a green or yellow colour to the stools. Bile, it is true, is often found in considerable quantity in those who die of dysentery, and frequently appears to be vitiated, but in different cases its appearance is extremely different. Sometimes it is in large, sometimes in small quantity, sometimes of one colour, sometimes of another ; in some cases it is thick, in some thin, and in others of a natural consistence ; so that no particular state of the bile seems connected with dysentery ; and in the cholera and other diseases we see the bile variously changed in quantity as well as quality without inducing this disease. By some it has been maintained, that dysentery is owing not to the presence of bile but some other acrid matter in the intestines, either produced in these cavities or in other parts of the body, and poured into them. But there seems in many cases no evidence of any acrid matter in the intestines till the disease itself has produced it.

Notwithstanding these observations, it seems not improbable that irritation of the intestines, kept up by bile, worms,* or other noxious matter, for a great length of time, may terminate in dysentery ; and that such causes are favourable to the operation of its contagion, and tend to increase its virulence, every day's experience evinces.

With regard to cold as a cause of dysentery, almost every writer on the diseases of the army informs us, that lying in the fields and doing duty in all kinds of weather are peculiarly favourable to its appearance. Here, as in other instances, cold is most pernicious when it alternates with heat, which is probably one of

* See Dr. Huxham's Account of the Epidemics of 1746.

the causes of the unwholesomeness of warm moist weather, when the heat during the day raises much vapour, which, being condensed, occasions damp and chilliness in the evening. Hence it seems to be, that dysentery often rages at the same time with remitting and intermitting fevers, and that these diseases are frequently combined in the same patient.* Fevers of all kinds, indeed, especially if they shew a tendency to become malignant, seem often accompanied with a predisposition to dysentery, if they are not capable of exciting it, and not unfrequently terminate in it. Dysentery, many think, never assumes the remitting form, except when complicated with remitting fever.

Concerning putrid effluvia, whatever share they may have in the first production of the disease, they never fail to increase the violence of its symptoms, and render it more infectious. Dr. Donald Monro, who had very frequent opportunities of seeing this disease, wholly attributes its production to obstructed perspiration and exposure to putrid effluvia. It first shews itself among the lower ranks, who keep their persons and houses dirty. Zimmerman even goes so far as to attribute to this cause alone the contagious nature of dysentery. For on its first appearance, he remarks, as it attacked many at the same time, it seemed to proceed from a cause which acted more generally than contagion could be supposed to do, and seemed only to become infectious in proportion as cleanliness was disregarded.

It is very doubtful whether (as Zimmerman seems to suppose, and as the great effect of the excrement in propagating the disease has induced many to believe) dysentery, like common typhus, may arise from putrid effluvia alone. The constant affection of the bowels must incline us to believe that there is something specific in the contagion of dysentery. I had occasion to observe, in treating of contagion in the first volume, that a concurrence of certain causes may produce diseases which cannot be produced by any of these causes singly, and that if the disease thus occasioned be contagious, as the peculiar concurrence of causes which first produced it, where many are required, will seldom happen, it will seem in every instance to be propagated by contagion alone. Thus we find, that a very simple concurrence of circumstances is sufficient to occasion typhus, which afterwards spreads by its own contagion. It seems from many observations not improbable, that many causes, the application of cold, a diet of difficult digestion, &c. which would in ordinary circumstances occasion diarrhœa, may, when the patient is constantly exposed to putrid effluvia, produce dysentery.

When the plague, typhus, and other contagious fevers, it was observed in a former volume, are prevalent, few other diseases

* See the observations of Sir John Pringle, Dr. Donald Monro, &c.

appear, and those which do, partake of the nature of the prevalent epidemic. The same observations have been made respecting dysentery. While the dysentery raged, Degner observes, there was hardly any other disease to be met with except diarrhœa and one or two cases of small-pox. I knew very few, he adds, that during this time were confined to bed by any other disease but the dysentery. Most writers on this disease observe, that the diseases which appear while dysentery rages partake of its nature. Intermitting and remitting fevers, in particular, are apt to be accompanied with dysenteric affections of the bowels. It was an observation of Sydenham, that the epidemics of the same year bear some resemblance to each other, and we find that the worst kinds of dysentery, in which the fever is typhus and the stools very fetid, are often preceded or followed by what has been called a putrid fever.

SECT. IV.

Of the Treatment of Dysentery.

THE treatment of dysentery, Dr. Cullen observes, for want of a proper view of the nature of the disease, seems to have been in several respects fluctuating and undetermined. He therefore explains what he conceives its nature to be, and thus endeavours to establish with more accuracy the proper treatment. Dr. Cullen's idea of the proximate cause of dysentery, namely, its depending wholly on a preternatural constriction of the intestines, is very far from being established; at the same time, it may be regarded as the most probable opinion which has been offered, and as it serves to fix in the mind certain parts of the treatment, it may be useful to keep it in view.

It does not however lead, a priori, to the whole of the treatment which has been found most successful, and might even suggest an early and free use of opiates and other modes of practice which are hurtful. We cannot, therefore, agree with Dr. Cullen, in regarding the removal of the supposed constriction of the intestines as the indication on which the whole treatment rests. Sir John Pringle seems to have regarded our knowledge of this disease as too confined to admit of our laying down indications of cure. But although we are not warranted, perhaps, in laying down such as imply a knowledge of the proximate cause, it does not seem difficult, if we attend to the effects of the means found beneficial, to form indications of cure which will serve for conducting the treatment. From a review of these means it would appear, that there are two indications in dysentery; to procure the evacuation of the natural fæces, and as soon as this indication is answered, to restore the tone of the bowels.

The first of these indications is answered, first, by removing irritation and other causes which render the motion of the bowels ineffectual in expelling the fæces ; secondly, by increasing the motions of the stomach and bowels by cathartics. The circumstances which, besides irritation, tend to prevent the relaxation of the bowels, seem reducible to the two heads of increased excitement and debility.

In considering the first set of means of fulfilling the first indication, I shall necessarily be led to make some observations on the use of cathartics. Such as are not immediately connected with them I shall refer to the head of cathartics.

It is of the first importance in this disease, that every thing which tends to irritate the stomach and intestines should be avoided ; the diet, therefore, we shall find, ought, with the exceptions afterwards to be pointed out, to be of the very mildest kind. But it is not sufficient that the ingesta be mild ; we must, as far as we can, expel the morbid contents of the primæ viæ, and allay or prevent the irritation occasioned by those which we cannot remove ; for whether dysentery be occasioned or not by irritating matter in the primæ viæ, it is always attended with more or less of it ; the most pernicious source of irritation in this disease.

The morbid contents of these cavities are to be expelled by emetics and cathartics. With regard to the latter, they are of such importance in this disease, that I shall have occasion to notice them in every part of the treatment, and shall therefore only observe here, that one of the most essential ways by which they are beneficial in dysentery, is, by removing the noxious contents of the intestines.

The use of emetics is chiefly confined to the early periods of the disease. They are particularly indicated where the stomach is loaded, especially if at the same time the excitement is considerable, with a dry, parched skin. At the commencement, indeed, the excitement is seldom so low as to counterindicate their use, which is not merely that of emptying the stomach and preventing the introduction of irritating matter into the intestines, for they determine to the skin, thus tending both to allay the fever and relax the bowels. When the stomach is much loaded, emetics are often employed with advantage as late as the tenth, twelfth or fourteenth day. As might be inferred, a priori, from the purposes which they seem to serve in this disease, their frequent repetition is seldom proper, and often does harm by the debility it induces.* The emetics generally employed in dysentery

* For the use of emetics in dysentery the reader may consult the works of the different authors I have had occasion to mention, particularly those of Sir J. Pringle, Dr. Cleghorn, Dr. D. Monro, Dr. Cullen, and Dr. Zimmerman, of whose work a translation from the German is given by Dr. Hopson.

are, the antimonium tartarisatum and ipecacuanha. They should be given in small and repeated doses, that they may partly pass the pylorus before exciting vomiting, unless the symptoms of oppressed stomach are urgent. The preparation of antimony, termed the vitrum antimonii ceratum, has been celebrated as an emetic in dysentery, but is now, on account of the roughness and uncertainty of its operation, very generally laid aside.

The only means we have for defending the intestines against the acrimony of their contents, are mucilaginous and oily demulsions. The latter seem to be the most effectual, but they are most apt to oppress the stomach, their employment consequently should be chiefly confined to clysters. A solution of gum arabic or tragacanth in water sweetened with sugar, or water gruel, or milk in which flour has been boiled, when it does not oppress the stomach, may be drank.

In preparing oily clysters, the oil should be rubbed with a sufficient quantity of mucilage to make it mix readily with milk, of which the remaining part of the clyster should be composed. These means relieve the pain and tenesmus, and seem to act partly by lining the internal coat of the intestines and thus defending them against the acrimony of their contents, and partly as a warm bath, by their bulk, warmth, and blandness softening and relaxing the bowels.

When, notwithstanding these means, the irritation and griping are still severe, we must call in the aid of external means, particularly the warm bath, fomentations, and blisters. The first is strongly recommended by Sir George Baker; the semicupium is sometimes used with advantage; fomentations of the abdomen are more frequently serviceable. The addition of strong peppers and spirits to the fomentations, by acting as rubefacients, considerably increase their efficacy. We are not, however, to expect so much from any of these remedies as from a large blister applied over the abdomen. In mild cases so severe a remedy is not necessary.

Certain medicines have been recommended with a view more directly to allay spasmodic contractions of the bowels. Of these, opiates are unquestionably the most powerful. Concerning their exhibition in this disease, however, there has been some difference of opinion. There is scarcely any writer on dysentery that does not warn us against the early use of opiates.* But if judi-

* I have always looked upon it, says Zimmerman, as dangerous to give opium in dysentery, before the fuel which feeds the disease is burnt out. "Si astringentia et opiata præpropere dantur (Huxham observes) mox gravissime accedunt tormina, stomachi ægritudo, singultus, aphthæ, tandemque intestinorum sphacelus, quem cito mors excipit." Lieutaud, Dr. Blane, Sir John Pringle, and many others might be quoted to the same purpose. Even Dr. Cullen, whose opinion of the disease seems to point

ciously employed, they are valuable medicines in this disease. They are the most powerful we possess for allaying the pain and tenesmus, which are often intolerable.

It is only, however, after a pretty free evacuation has been procured by cathartics, that opiates are admissible; they may then be given with advantage in the evening, for the purpose of procuring sleep, and the more so as the pain is generally most severe in the night time. It has been observed, indeed, that if opium allays the local symptoms, it occasions a proportional increase of the febrile. But the latter effect is seldom considerable, unless it be exhibited before a proper relaxation of the bowels, or while the excitement is great.

At whatever period of the disease opiates are given, their tendency to occasion costiveness must be carefully obviated. Some have proposed combining a cathartic with the opiate, expecting that while the cathartic obviated the constipating effects of the opium, it would counteract the irritating quality of the cathartic. This plan, however, has not been found so successful as we might, *a priori*, expect. It has been found better to give the cathartic alone, and the opiate after its operation is finished. With nauseating doses of emetics, indeed, opiates are sometimes combined with advantage; this combination, however, is prescribed less with a view to move the bowels than to promote perspiration.*

The hyosciamus has not, as far as I know, been recommended in dysentery, although its anodyne and gently laxative qualities seem eminently to adapt it to this disease. I have employed it with advantage in cholic, in which it is recommended by Dr. Cullen.

Clysters are often used with much advantage as a vehicle for anodynes in dysentery. The intolerable irritation about the rec-

out opium as the principal remedy, observes, that by occasioning an interruption of the action of the small intestines, it favours the constriction of the colon, and thereby sometimes aggraves the disease, and that if the use of it supersede the employment of purgatives, it commonly does much mischief. I believe indeed, he adds, that it is only the neglect of purging that renders the use of opiates necessary.

* Dr. D. Monro gave Dover's powder in large doses, from one to two scruples. It proved, he observes, a good sudorific and anodyne in some cases, though in others it made the patient sick without producing any good effect. It commonly answered better when used occasionally as a sudorific, than when its use was continued. Although a combination of opium and ipecacuanha cannot be depended upon as a cathartic, yet it sometimes operates in this way, and when it does, its operation occasions very little irritation. Dr. Brocklesby informs us, that every night and morning a combination of one part of opium with three of ipecacuanha proved very serviceable. The ipecacuanha thus administered proved only gently laxative, whilst the opium composed the spasmodic affections of the intestines.

turn naturally suggests them. When the motions were so frequent that mere emollient clysters could not be retained, Sir John Pringle used generally to add from 20 to 60 drops of laudanum to each, or more if it was necessary, provided it did not affect the head.

Some practitioners when they dread a mortification of the large intestines, add antiseptic ingredients to the anodyne clysters. Mr. John Hunter (the author just mentioned informs us) often used antiseptic anodyne clysters with the best effects. He made the first trial with four ounces of a strong decoction of bark, with some grains of opium dissolved in it. He afterwards used with success a decoction of the tormentil root, and of oak bark in the same way. The clysters were repeated if returned without allaying the tenesmus.

Some medicines are warmly recommended as means of allaying the griping, the operation of which, it is not so easy to explain, unless we allow that their bulk, warmth, and gently tonic power may have the effect. Among the chief of these, are lime water and an infusion of camomile flowers.* Other similar infusions are recommended for the same purpose. We have reason to believe, that the warm water is the chief part of the remedy; for this, we shall find, has been recommended alone, and sometimes with success, as the only remedy.

When the excitement runs high, it is difficult to procure the proper expulsion of the fæces in dysentery. The same means which fail during such excitement, often succeed when it has been reduced. To remove excitement therefore, is, both on this account, and because nothing tends more to debilitate than the continuance of great excitement, an indication of much importance at the commencement of the disease.

The means of removing irritation, just considered, form an essential part of those which fulfil this part of the indication; but it is often necessary to have recourse to more active measures. It is to be recollected, however, that less is to be feared in this disease from an excess, than from a deficiency of excitement; the remedies, therefore, which moderate excitement, particularly the more powerful, are to be used with caution.

In warm climates, in particular, in this, as well as in other febrile diseases, even where there is a necessity for em-

* Dr. D. Monro gave the lime water mixed with milk, which proved serviceable to some; in other cases it failed. The infusion of camomile flowers seems preferable to lime water. Sir John Pringle says, that for mitigating the gripes and expelling wind, he has found nothing equal to fomentations and drinking camomile tea. And Zimmerman observes, that next to opium he found the infusion of camomile flowers the best means of alleviating the pains. Dr. Monro and others make similar observations.

employing powerful antiphlogistic measures, they are often succeeded by sudden and dangerous debility. In colder climates, such means may be employed with more safety, but have, upon the whole, perhaps been used more freely than experience seems to warrant. It is true, indeed, that some of the most powerful of these means, particularly emetics and cathartics, are employed in dysentery for other purposes, and even when the excitement is below the proper standard, their tendency to increase the debility, being more than compensated by their relieving the local affection which supports the disease; the same may be said of diaphoretics; blood-letting, therefore, is the only evacuation recommended wholly with a view to diminish excitement.

The reader will find many speaking of blood-letting at the commencement of dysentery as necessary, in short, as a remedy to be had recourse to, if all the remaining strength of the patient will bear it.* Such writers speak as if they expected from blood-letting some essential change in the state of the local affection, and therefore insist upon its employment, wherever the general state of the system admits of it; and if an inflammation of the bowels always attended the commencement of dysentery, this expectation would be just. But this is rarely the case. Inflammation, when it does attend dysentery, is the consequence, not the cause of the disease, and therefore seldom supervenes early. Besides, those who recommend an indiscriminate use of the lancet in this disease, mention symptoms as warranting its employment, which do not indicate inflammation.

What advantage, then, do we derive from blood-letting at the commencement of dysentery, except where the excitement runs so high as to threaten immediate danger or much subsequent debility? Has it been found particularly powerful in allaying the pains, in removing the peculiar state of the intestines in dysentery, or promoting the evacuation of the natural fæces? If not, what compensates for the debility it occasions? Instead, therefore, of letting blood in all cases where the strength can bear it, it will be found a maxim better supported by experience, to avoid it wherever the symptoms can be otherwise allayed.

Even where the excitement is not very great, if there be a considerable hemorrhagy from the bowels, which seems supported by the degree of excitement present, venesection is sometimes advisable. This, however, seldom happens; hemorrhagy from the bowels in dysentery generally proceeding from debility or ulceration. Inflammation of the intestines is known here, as in other cases, by the great severity of the pain and tenderness of

* If the pulse and strength will permit it, says Lieutaud, begin the cure with blood-letting; and Akenside observes, that if the skin be hotter than usual, if there be rigors and the pulse is quicker than in health, there can be no doubt of the propriety of venesection. Observations from many other writers might be quoted to the same purpose.

the abdomen, and by a frequent, small, feeble pulse, more or less hard; symptoms which warrant blood-letting at all periods except in the last stage.* At this period of the disease, indeed, enteritis is not always accompanied with its usual symptoms. The tendency to gangrene is often so great that it supervenes on a degree of inflammation too slight materially to affect the state of the symptoms. I had occasion to explain in the introduction to the second part, why, in very debilitated states of the system, gangrene often supervenes on slight degrees of inflammation, the inflammation bearing the same analogy to passive hemorrhagy, which inflammation, with a strong vis a tergo, bears to active hemorrhagy. In such cases it is evident that blood-letting would only add to the evil.

With regard to the employment of refrigerants as a means of lessening excitement, there is little to be added here to what I have so often had occasion to say. Nitre given in any considerable quantity seems too apt to irritate the bowels. Saline draughts in the state of effervescence are perhaps the best of this class of remedies in dysentery, and should be given freely wherever the heat and strength of pulse are considerable. Contrary to an opinion once very generally received, vegetable acids are often serviceable in dysentery, particularly where there is much prevalence of bile.

When the indication is to lessen excitement, the diet must be such as shall co-operate with the foregoing means; but of the diet in this disease I shall presently have occasion to speak at length.

Such are the means of moderating excitement in dysentery; but the morbid state of the bowels is less frequently supported by increased excitement than by debility, the means of preventing and removing which form an essential part of the treatment of this disease. The debility, we found, is sometimes considerable from the commencement. In general, however, it is only in the more advanced stages that we have recourse to these means, namely, an invigorating diet and tonic medicines.

Our view is to support the strength with as little irritation as possible. A very full diet is generally too irritating, and too low a diet may induce a fatal debility. It is evident that no regulations respecting diet will apply to every case. It must be adapted to the state of the symptoms, the patient's habit, the nature of the epidemic, and the duration of the disease.

* "Nor were we discouraged," Dr. D. Monro observes, "from bleeding in the beginning by the low, quick pulse, which often attended the disorder; and we frequently found the pulse rise as the blood flowed from the vein. But when the sick were low and weak without much pain or fever, and the pulse was soft, we were more sparing of the vital fluid."

In all cases, perhaps, which have not been of long duration, the mildest diet is proper. The patient should be confined to gruel, sago, panada, &c. the quantity being regulated by the appetite. Sir George Baker and many others even forbid the use of chicken broth at the commencement.

Where the fever is slight, and there is reason to dread much debility, Dr. Akenside recommends not only different kinds of broths but the milder kinds of animal food in a solid form. Few practitioners, however, admit of so full a diet. Sir John Pringle says, that he formerly used to permit dysenteric patients to take a little mutton broth, but finding even this hurtful he has since forbid the use of it. Dr. Cleghorn, Dr. D. Monro, Dr. Zimmerman, &c. make similar observations.

Fruit has frequently been regarded as a cause of dysentery, and consequently avoided in this disease, not, however, it would appear on sufficient grounds. Zimmerman observes, that grapes were an excellent remedy in the epidemic dysentery. Sir George Baker says, that those who had taken an usual quantity of the summer or autumnal fruits either wholly escaped the dysentery, or had it in a very mild form. Dr. Cullen thinks the use of fruits should be chiefly confined to the beginning of the disease. It is only, he observes, in the more advanced stages that the morbid acidity of the stomach seems to prevail, and requires some reserve in the use of accecents. Fruit is particularly indicated when there is much bile in the *primæ viæ*.

When the tendency of the epidemic to debility is not very great, but the affection of the bowels severe, it is often proper for the first days, during which for the most part there is little appetite, to advise the patient to take nothing but some thin fluid, thin gruel, whey, or any other mild liquor. Whatever, indeed, be the other articles of diet, he should always take a large proportion of some fluid of this kind, which seems pointed out by the incessant thirst that generally attends dysentery. The drink should be given tepid, any thing cold, particularly at an early period, is hurtful.

It appears from the observations of many, that at the commencement nothing is superior to mere warm water. On this part of the treatment I speak at length, because none seems to throw more light on the nature of the disease.*

* "But though all these substances," Sir John Pringle observes, "are of the softest and least heating kind, yet I have observed the patient could not eat any of them, nor swallow any of the liquors mentioned above, nor almost any other, except plain warm water, without being sick or griped immediately after. It was therefore natural to conclude that till the stomach and bowels were able to bear some stronger nourishment without sickness or pain, nothing but water should be given for the whole diet. In this notion I was confirmed by some curious ob-

It is to be recollected, however, that much dilution is debilitating, and should consequently be confined to an early period; even then, indeed, when the excitement is much and suddenly reduced, it must be employed with caution. At more advanced periods, although the diet should never be irritating, it should be more solid. The milder kinds of animal food may be combined with farinaceous vegetables. If the former be found too irritating, the latter may be used alone, or the mucilaginous decoctions may be made of a thicker consistence. Where there is little appetite, however, harm may also be done in this way, by oppressing the stomach. Salep, arrow root, and sago have been particularly recommended. Their effects do not seem to differ materially from those of other farinaceous vegetables. Of the use of wine in dysentery I shall presently have occasion to speak.

With respect to the tonic medicines employed in dysentery, the tendency of this disease to inflammation has deterred many from employing them at any period, and at an early period they are generally hurtful, even where the debility is considerable. When dysentery, however, has been of some standing, and has occasioned much debility, or is complicated with typhus, or with intermitting or remitting fevers, the bark seems often to have proved highly serviceable. Sir John Pringle recommends it with the serpentaria, or the serpentaria alone, when the fever is of a

“servations on the dysentery, communicated to me about ten years ago by
“M. De Senac, who, during my service in the Low Countries, in the
“former war, was physician general to the French army, and who by
“that means became well acquainted with the distemper.

“The learned physician informed me, that having had good evidence
“for believing that several had been cured by only drinking large quantities of warm water for five or six days together, he had successfully
“made the experiment upon himself and upon fourteen more who submitted to this regimen. He added, that after having tried several other
“methods without being satisfied with any of them, he had at last fallen
“upon one which had answered to his wish, and by which he had made
“numberless cures. This, after evacuations by bleeding and by a vomit
“of emetic tartar, consisted chiefly of one grain of emetic tartar dissolved in a pint of common whey or chicken water, given every day
“for all food, drink, and medicine, till the patient recovered. His intention was to keep a free passage from the stomach to the rectum by the
“mildest laxative, which he found was best answered by that minute
“quantity of the antimonial.” Zimmerman, Huxham, Degner, &c. agree with Sir John Pringle in the great advantage of plentiful dilution. With regard to washing away and allaying the bilious acrimony, Zimmerman observes, I considered copious drinking as very serviceable. Some old women indeed, he continues, of the last century were of opinion that a great part of the cure of dysentery consisted in abstaining from drinking, which in their opinion increased the purging. But the experience of later years has taught us, and very great physicians, Baglivi, Huxham, and Tissot, have maintained, that copious drinking is no where more necessary than in dysentery. Water when drank in great quantities is an universal remedy in this disease. A vast number of dysenteries, he observes a little lower, were cured only by taking a tea cup full of warm water every quarter of an hour.

malignant nature.* Lautter, in his *Historia Med. Bien.* observes, that when the fever remitted, the urine depositing a lateritious sediment, however irregularly and however short the remissions, he immediately had recourse to the bark, which he gave in substance. Scarcely, he observes, had the patient taken half an ounce when the stools became less frequent the griping was allayed, the tenesmus, which formerly baffled all means which could be employed, almost wholly ceased, and the pulse at length lost its unusual frequency. Dr. Cullen, Dr. Cleghorn, and many others, make similar observations. "The great similitude," the latter observes, "which there is in many respects between tertian fevers and dysenteries, induced me frequently to make use of the bark in the last named disease. When the fever and gripes were regularly exasperated, either every day or every other day, at stated periods, it has often effectually put a stop to both, especially if the exacerbation began with chilliness and terminated in sweats; at other times it removed the fever, the flux continuing without much alteration." He adds, what we might have foreseen, "In some cases I have given the bark, merely with a view to prevent the mortification of the intestines in the last stage of the distemper, but I am sorry to say it was seldom so successful as I could have wished."

That the bark is often highly useful in dysentery of long standing, which has occasioned much debility, particularly in those advanced in life, although it is complicated neither with typhus nor intermitting fever, appears from many observations. In such cases Dr. Akenside gave it combined with a cathartic. In all the foregoing cases it is often necessary to combine it with mucilage and opium, to prevent its irritating effects, especially when in the decline of the disease it renders the diarrhœa profuse.

The connessit bark, the cortex eleutheriæ, and cascarilla† seem also to be frequently useful in dysentery, particularly in the foregoing cases.

* "In 1760," he observes, "Dr. Whytt wrote to me, that in this bad state of the dysentery, when the mouth and alimentary canal were threatened with aphthæ, and even sometimes after they had appeared, he had successfully given the bark, having first made such evacuations as the case required or the patient's strength could bear, by blood-letting, vomiting with ipecacuanha, and purging with rhubarb. That to a pint of strong decoction of the bark he added three drams or half an ounce of confectio japonica, and ordered two spoonfuls every four hours of this medicine without any other, except some laudanum at bed time. That when by the continued use thereof the body became costive, he then gave rhubarb, and after that went on with the decoction of the bark, but with less of the confectio, or even without it."

† See the observations of Dr. Brocklesby, and the *Edinburgh Medical Essays*, vol. iii, article 4.

‡ See the *Memoirs de l'Academie des Sciences*, à Paris, 1719, and Dr. D. Monro's *Observations on the Diseases of the Army*.

In the advanced stages when the debility is considerable, or earlier if typhus attends wine has been found eminently useful. Dr. Brocklesby sometimes allowed his dysenteric patients a pint and a half of Port wine, or even more, every twenty-four hours. He diluted the wine with water, and generally gave aromatics along with it. Dr. Monro says he often found the wine increase the griping; when this happened, he ordered his patients half a gill or a gill of brandy, properly diluted with barley or rice-water.

Some object to the early use of Port wine, on account of its astringency; and Zimmerman and others to the use of all kinds of wine and distilled spirits at every period of the disease. Aromatics and wine, this author observes excite a dangerous irritation in the bowels, increasing the pain, fever, and strangury.

It is probable, from comparing what Zimmerman says of these remedies with what is said of them by others, that he did not distinguish with sufficient care the cases in which they should be employed. If there be any considerable tendency to inflammation, and still more if the excitement is above the healthy degree, they will do harm. And even where neither the excitement nor tendency to inflammation is great, if the bowels are irritable, wine must be given with a large proportion of mucilaginous and other substances, which blunt its pungency. It may be given in many cases when the bark in every form is improper. It is to be recollected, that the irritating and inflammatory tendency of wine bear a much smaller proportion to its tonic power than these qualities of the bark do to its tonic power. Distilled spirits should, if possible, be avoided.

With regard to aromatics, they have generally been given with the wine and bark. Some have condemned them in all cases as too irritating. They seem less adapted to dysentery than the latter medicines, since their tonic effects bear a much smaller proportion to the irritation they occasion.

Few recommend iron in any form of dysentery. In chronic cases it is said that zinc has sometimes proved serviceable.

The most essential part of the means of fulfilling the first indication in dysentery, remains to be considered, the employment of cathartics. These are indicated at all periods of the disease, and all the other means which have been mentioned may be regarded as useful only as far as they conduce to their more certain, mild, and safe operation.

When the excitement runs high, or there is reason to suspect much tendency to inflammation, blood-letting must be employed; when the stomach is oppressed or the fever considerable, an emetic is proper; and when the debility is urgent, tonic medicines must immediately be had recourse to. With these excep-

tions, gentle cathartics are the first medicines we employ in this disease.

There has been much difference of opinion concerning the cathartics best suited to dysentery. Dr. Cullen justly observes, that as the cathartics must frequently be repeated, the most gentle are the safest, particularly on account of the tendency to enteritis.

There is no cathartic which has been so generally recommended in dysentery as rhubarb, although in several respects perhaps it is among the most improper. Both Dr. Cullen and Sir George Baker are of this opinion. It operates, the latter observes, slowly and weakly, and almost always with an increase of the griping and inflammation of the bowels. Sir John Pringle proposes combining calomel with the rhubarb, by which, he observes, the operation of the latter is rendered easy. The addition of calomel, however, will not render rhubarb a proper cathartic in dysentery; and Sir George Baker remarks that this combination will generally be found to answer the worse, the greater the proportion of rhubarb. Degner recommends the rhubarb in tincture taken in some watery fluid, which is perhaps more exceptionable than the powder.

Calomel alone has been much extolled, and where there is a tendency to inflammation it is perhaps one of the best cathartics in this disease; but it ought never to be given alone, its operation is always rendered both more certain and more easy by combining it with other cathartics. In many, particularly when taken alone, it occasions tenesmus, and I have repeatedly seen it induce a temporary dysentery.

A diluted infusion of sena, mixed with a considerable proportion of manna in order to diminish as much as possible its tendency to griping, is an excellent cathartic in dysentery, though not always sufficiently powerful. Few cathartics have been more generally recommended, particularly by the army physicians, or seem to have answered better, than a combination of Glauber's salt, or the bitter purging salt with manna.* Cream of tartar has been much celebrated in dysentery. Zimmerman gave it with tania-

* The following is Dr. Huck's method of giving them. "I used to purge with two ounces of manna and one ounce of Glauber's salt dissolved in a quart of water, whereof a quarter of a pint was drank every half hour till it procured two or three copious stools." (See Sir John Pringle's *Observations on the Diseases of the Army*) This cathartic he repeated every third or fourth day, till the griping, &c. abated. Some physicians have added a little oil to this composition, that its operation might be rendered still more easy. Mucilage is preferable, as less apt to oppress the stomach. This medicine, it is probable, would be further improved by being prepared with a light infusion of sena. The greater the number of cathartics we combine, the more certain and easy their operation generally proves.

rinds. The latter he considers an admirable medicine in this disease, particularly where the stools are bilious.*

Upon the whole, however, no other cathartic has been so celebrated in dysentery as ipecacuanha, given in small doses to prevent its proving emetic. Piso was the first who recommended it in dysentery; and it is now regarded as a specific in this disease. From the very many trials I have made with it, it appears to me to be the best of all cathartics in dysentery, which probably, in part at least, depends on the relaxation it induces on the skin, which is always accompanied with a tendency to similar relaxation in the alimentary canal. The antimonium tartarisatum has since been recommended, and is regarded by many as not inferior to ipecacuanha. Where the inflammatory tendency and the excitement are considerable, it is an excellent remedy, but seems upon the whole, much inferior to the latter in relieving that peculiar state of the bowels, which appears to constitute the disease. The proper dose of these medicines is such as produces some degree of nausea without vomiting, and it should be repeated when the nausea abates.

I have already had occasion to make some observations on the use of clysters; they are proper, although cathartics be employed, by tending to allay the pain and irritation, particularly about the rectum, and to promote the operation of the cathartic; they should never, however, be substituted for the latter, but made as mild as possible, otherwise if they fail to move the bowels, by the irritation they occasion they may increase the disease.

Although we have procured an evacuation of the fæces, and consequently a remission, the patient is not to be regarded as secure against a renewal of the disease. If the medicines are suddenly laid aside, it will return, and prove perhaps more dangerous and obstinate than at first. Their dose, therefore, should be gradually lessened, and the patient should be particularly cautious in abandoning the mild diet, so peculiarly necessary in this disease.

Dysentery, we have seen, frequently terminates in diarrhœa, and though this symptom is favourable, if no attention is paid to it, it may go too far, and even produce a dangerous degree of debility, particularly after so severe a disease. When it is considerable, and particularly when at the same time the powers of the stomach are much weakened, it is often proper to have recourse to some mild astringent medicines. Small doses of kino or extract of logwood may be employed, and in the latter case they

* Cream of tartar and tamarinds, he remarks, did not only occasion no pain, but very much diminished it, when they proved sufficiently purgative. They had also this advantage over rhubarb, that by means of their acidity they acted very powerfully against the putrid fever. He subjoins several cases, tending to shew the advantage of tamarinds in this disease.

may be combined with a small quantity of the rust of iron. From what has been said of the nature of dysentery, the reader will readily perceive that these must be used with caution.

I have referred astringents to this place, notwithstanding their having been frequently recommended with a view to remove the dysenteric symptoms, because, if we except the tonic medicines above-mentioned, some of which are astringent, given in the cases which have been pointed out, there is hardly any medicine of this kind which seems to have been attended with much advantage while the dysenteric state of the intestines continued, and they have generally been found to increase the griping and tenesmus.* There seems to be but one case in which mere astringents are proper while this state continues, namely, where there is a copious discharge of blood, to check which, vitriolic acid and alum, and if the hemorrhagy is of the passive kind, the bark, are the best.

* If astringents were useful, says Dr. Huck. (Sir John Pringle on the Diseases of the Army, p. 266) it was only when a laxity of the bowels remained after the disease. The old physicians, says Zimmerman, so far agreed with one another in the cure of the dysentery, that instead of trying to evacuate the matter, they chose unanimously rather to retain it, by incassating and astringent remedies. Such notions, he continues, as are the produce of ignorance and folly, are not easily eradicated. If astringents be given too early, says Huxham, the worst symptoms follow. Dr. Cullen and most of the best modern writers on dysentery might be quoted to the same purpose.

The simaruba, which is a very gentle astringent if it at all derive the name, has been regarded as a valuable specific in dysentery. It is the bark of an unknown tree brought from Guiana in South America, where it has long been celebrated for the cure of dysentery. It was brought into Europe about the middle of the last century, and is said to have cured dysenteries which had resisted every other means. It is given in the dose of from half an ounce to an ounce of the decoction. Degner informs us, that he used this medicine with success after proper evacuations. It acts mildly, he observes, and almost insensibly, and produces its effects more certainly in the bloody than in the bilious discharges. He thought that its efficacy was increased by the addition of the cascarilla. Sir John Pringle made a few trials of the simaruba, which he says were in its favour; but he observes, that he only found it useful towards the decline of the disease. It seems to have been particularly useful when nothing but a diarrhœa remained, and at other times when the quantity of blood passed was very great. "In protracted cases," Dr. Brocklesby observes, "I tried the simaruba, to the quantity of thirteen grains in powder, or a dram in decoction, every six hours; and I really think it justly merits a place in a military materia medica, to be used only second to the bark in flux, whilst yet a slight feverish indisposition of the remitting kind continues to harrass the patient. Nor did I pass over, altogether unnoticed or unessayed, in such cases the celebrated Tilicherry bark, now and then brought to Europe from the coasts of Malabar, and there said to be a sovereign remedy in slow fevers and fluxes. But I did not find it answer here better than other bitter aromatics, tending, in common with all that class, to strengthen and restore the tone of the solids, especially those of the primæ viæ. But it proved too narcotic to be used as freely as the simaruba, and I found it occasion in one patient the spasmus cypticus when given to the amount of two drams in 24 hours."

Absorbents are also recommended in the decline of the disease, as acidity of the stomach chiefly prevails at this period. With these, as well as the astringents, opium is often combined with great advantage, particularly when the patient is still harassed with griping.

It is not uncommon for some time, for slight but very troublesome renewals of the griping, tenesmus, and even mucous stools, to take place. In these cases, small doses of ipecacuanha with opiates, or even opiates alone, with a cathartic once at least in every three days, are often eminently serviceable.

For some time after the disease the patient should wear flannel next the skin, and ride on horseback or in a carriage, according as his strength permits, carefully avoiding exposure to cold.

For strengthening the bowels after dysentery, the Bristol waters have been much recommended.

When there is reason to suspect that the disease has left an ulcer of the intestines, balsams, particularly the balsamum chire or copaivæ, rubbed with oils, have been employed, though seldom with success.* I had occasion to make some observations on ulcers of the intestines when speaking of the enteritis.

For removing the tenesmus which so frequently remains after the other symptoms of dysentery have disappeared, small mucilaginous and anodyne clysters, with occasional gentle cathartics to evacuate any irritating matter that may still be lodged in the alimentary canal, are the best means.

* See Dr. D. Monro's Obs. on the Dis. of the Army, and Dr. Mead's *Monita et Præcept. Med. cum Notis Wintringhami*, vol. i.

APPENDIX I.*

IT was intended, as expressed in a former volume, that the subject of the present should form two volumes. I found, however, that by the following deviations from my original plan, the whole might be comprised in one. My intention was, at the end of the work to give a more detailed view of the Nosology of Febrile Diseases; this I have omitted, as the principal observations I wished to make on the subject are to be found in the general Introduction, or in other passages. I have considered under one head the different species of hemorrhagies, (other reasons for which are given at the beginning of Book ii.) by which the space they occupy will be much lessened; and some other parts of the subject I have condensed more than I intended. One disease I have passed over in silence, and shall here therefore make the few observations on it which appear to me necessary, I mean Catarrh. In its common and mildest form almost every person, whether of the medical profession or not, is acquainted both with its symptoms and mode of treatment. The epidemic catarrh is a more serious disease and less generally known, but, like common catarrh, it only proves dangerous when it runs into some of the diseases which I have treated of at length, chiefly the different species of simple fever, pneumonia, peripneumonia notha, and phthisis; and as I have pointed out the manner in which the treatment of these diseases is suited to different circumstances and habits, what has been said of them will be found readily applicable to the more alarming forms of catarrh, in which they supervene. As to the milder form of epidemic catarrh, so much has been written on it, during the last twelvemonth, in every part of Britain, that any observations on it at this time seem to be superfluous.

I have endeavoured in this volume to profit by some judicious observations made on the preceding volumes, and have supplied the want of accurate references by giving an alphabetical catalogue of the books, with the editions referred to throughout the work.

I have been censured for having in a former volume allotted so many pages to the small-pox. Had the observations on this disease been published so late as the present date, I should probably have curtailed them; but, even on the supposition that the small-pox shall be wholly banished, the accurate knowledge we have acquired of this disease will still be found of the first importance. No other of the exanthemata has demanded so much attention and been observed with so much care, and such is the

* This Appendix forms the Preface to the 4th Vol. of the original Work.

similarity between the individual diseases of this order, that did the small-pox no longer exist, in observing the phenomena and improving the treatment of the other exanthemata, we should long have occasion to refer to the observations which have been made on it.

My object in undertaking this work I have explained in the prefaces to the first and second volumes, to present, at one view, all the useful knowledge we possess of febrile diseases, of perhaps more than two thirds of the most important diseases which come under the physician's care. If this object be tolerably well answered, the extensive nature of the work and the great labour it has cost continued, for the most part amidst other unavoidable occupations, for more than ten years. will, I hope, be admitted as an apology for less important blemishes.

The same circumstances which have delayed the publication of this volume a year and a half beyond the time first proposed, will for the present prevent my entering on the work mentioned in the preface to the second volume.

APPENDIX II.*

AN

EXPERIMENTAL ENQUIRY

INTO THE CIRCUMSTANCES

INFLUENCING THE URINARY DEPOSITIONS

WHICH APPEAR

IN FEBRILE DISEASES.

BEFORE I proceed to relate these experiments,† it is necessary to take notice of the following circumstances. They were made at different times, and they were not all performed with the same degree of accuracy. All of them, however, seem sufficiently accurate to enable us to determine with certainty concerning the result. Besides, every point is proved by the more accurate experiments, and their result confirmed by others less so. The chief circumstance wherein the inaccuracy of these last experiments consists, is, that I did not take notice of the state of the thermometer while they were performed; but as hardly any of them lasted above three days, it is not probable that the temperature could vary much: and as it must be evident, from considering the experiments where the state of the thermometer is mentioned that even considerable changes in this did not vary the result; it will appear, that every experiment I am to relate has been performed with all the accuracy requisite. Where the thermometer was used in any experiment, the state of it is generally mentioned every day till the urine was examined; although, in relating the experiment, the deposition of the urine is always mentioned on the day on which it was made, that the result may be the more easily perceived. With regard to the state of the persons on whom these experiments were made, their particular situation at the time is afterwards mentioned. It is enough at present to observe, that none of them had ever been troubled with any calculous affection.

* This Appendix is at the end of the 3d Vol. of the London Edition.

† The following experiments were made with a view to determine the circumstances which give a predisposition to urinary gravel, and were first published in 1792.

EXPERIMENT I.

IN this case, as well as in all the other experiments which I am to relate, I kept the dishes containing the urine in a place at a distance from any fire, and consequently little subject to changes of temperature.—The thermometer, where it is mentioned, stood in the same place.

The following experiment I made on myself when in good health.

Living partly on animal and partly on vegetable food, and at the same time taking a certain degree of exercise; morning, mid-day, and evening, I set apart a portion of urine in clean vessels. After these had stood 48 hours, I found in each of them a deposition, which had the appearance of a fine red sand, precisely similar to the brick coloured sediment which is deposited by the urine towards the decline of febrile diseases, and which, after Scheele, I shall call the *lithic acid*; the several depositions, taken together, weighed gr. j1-2.

On the following day, living in the same manner with respect to diet and exercise, I set apart, as formerly, portions of urine, which, after standing the same length of time, had also deposited gr. j1-2 of lithic acid; on the evening of this day I eat a lemon. Next morning I set apart a portion of urine, eating at this time a second lemon; about dinner-time I eat a third, and set apart another portion of urine; in the evening I eat another lemon, and set apart another portion of urine. All this day I had taken no animal product but milk, which is acescent, and had taken nearly the same quantity of fluid as on the former day, and the same exercise. After each of the above portions of urine had stood 48 hours, I found in them a deposition of lithic acid, amounting to gr. ii1-2. Next day I used the same regimen; and the portions of urine, after standing the same time, also deposited gr. ii1-2 of lithic acid; the depositions of the two last days not differing one fifth of a grain.

The portions of urine set apart on the different days of this experiment were exactly equal to one another; as were those in every experiment I am to mention; except where the whole urine made was kept. Either of these methods evidently gives a result sufficiently decisive. I also used, in all these experiments, vessels of a similar size, and similarly shaped; for the vessel exposing a larger or less surface to the air, evidently affects the deposition.

One fact, which seems curious, I observed to take place in this experiment, and as often as I examined my urine, at different times of the day, except in particular circumstances afterwards

to be mentioned ; the morning urine was darkest coloured, that made at mid-day next, and that in the evening palest.

EXPERIMENT II.

WAS made on a boy 15, in good health, which he enjoyed during all the experiments which I made on him.

Monday.

On getting out of bed, at 8 in the morning, he emptied the bladder. Having eat nothing before 9 o'clock, at that time he took for breakfast,

of bread,
of milk, *sing.* oz. viij.
of honey, dr. j.

At 11 in the forenoon, he set apart of urine oz. vj. ; (Farenheit's thermometer standing at 29°.)

At 3 in the afternoon, he set apart of urine oz. vij. (therm. 29°.) ; at this time he eat of honey oz. j. About half past 3, he took for dinner,

of sour cream, oz. xvj.
of bread, oz. xj.
of sugar, dr. vj.

At 6, he made of urine oz. iij. ; this was not kept.

At 7, he took of milk, oz. viij. of bread, oz. vj.

At half past 8, he set a part of urine, oz. iij. All his urine this day was oz. xix, his drink being oz. xvj. beside oz. xvj. of sour cream, which was semifluid. All the three portions of this day's urine, after having been kept 48 hours, contained both crystals of lithic acid, and a cream-coloured sediment, which precisely resembled the furfuraceous sediment observed in the decline of febrile diseases, or at any period when there is much sweating. The crystals of lithic acid amounted to gr. 3-4.

Tuesday.

On getting out of bed, at 8 o'clock in the morning, he emptied the bladder.

At 9 o'clock, he took for breakfast,
of bread, oz. viij.
of milk, oz. x.
of honey, oz. j.

At 11, he set apart of urine oz. vj. (ther. 32°.)

At 3, he also set apart of urine oz. vj. (therm. 32°.) At this time, he eat of honey oz. j.

At half past 3, he took for dinner,
 of sou'r cream, oz. xij.
 of bread, oz. x.
 of sugar, dr. vj.

At 6 he took of bread, oz. vij.
 of milk, oz. viij.

At half past 7, he set apart of urine oz. vij. (therm. 33°.) All his drink this day was lb. j. oz. ij. beside the cream; his urine, lb. j. oz. v. I kept each portion of this day's urine 48 hours also. The appearances at the end of that time were as follows; in the morning urine I found a little cream coloured sediment, with some lithic acid; in the mid-day urine no cream coloured sediment, some lithic acid; the evening urine contained little cream-coloured sediment, and a good deal of lithic acid. The whole lithic acid of this day's urine was gr. j1-2.

Wednesday.

At 10 A. M., thermometer 33°,; at 3 P. M. thermometer 33°.

Thursday.

In getting out of bed, as formerly he emptied the bladder.

He took for breakfast at half past 9 o'clock,
 of fish, oz. v. 1-2.
 of water, oz. iv.

At 11, he set apart of urine oz. vij. (ther. 33°.)

At 3. he set apart of urine oz. viij. (ther. 33°.)

He took for dinner,
 of beef, lb. 1-2

He took nothing after dinner, and at 8 in the evening he set apart of urine oz. viij.; this day his drink was but oz. iv.; his urine lb, j. oz. vij.; so great a check had perspiration suffered by that sickly disgust, of which he complained from living so much on animal food. After each portion of this day's urine had stood about 48 hours, I found in all much cream-coloured sediment; but in none of them any lithic acid.

Friday.

Getting up as usual at 8 o'clock, he emptied the bladder. His breath this morning had a very sour smell, which even infected his bed-room. He now expressed so great a disgust for animal

food, that I could not prevail on him to continue the use of it alone. He therefore lived to-day in the following manner.

At 9 o'clock in the morning, he took for breakfast,
 of mutton, oz. iv. 1-2.
 of potatoes, oz. vj.
 of small beer, oz. viij.

At 11, he made of urine oz. vij. The state of the thermometer to-day was, by mistake, not attended to ; but that of the weather was not sensibly different from what it had been the day before.

At 3, he set apart of urine oz. vj. and took for dinner,
 of mutton. oz. vj.
 of potatoes,
 of small beer, *sing.* oz. viij.

He eat nothing more this night, till the experiment was ended.

At 7, he set a part of urine oz. vij. ; his drink to-day amounted to lb. j. his urine to lb. j. oz. iv. ; the sourness of his breath went off towards evening. This day's urine was poured off, each portion about 48 hours after it had been made. The appearances were these : In the morning urine I found some lithic acid, no cream-coloured sediment ; in the second portion of Friday's urine, I found some cream-coloured sediment, and some lithic acid ; in the last portion there was no lithic acid, but a good deal of the cream-coloured sediment. It is remarkable how quickly the urine is affected by acidity in the alimentary canal. The urine which was made in the morning when the breath was very sour, deposited chrystals of lithic acid, without any cream-coloured sediment ; the mid-day urine, made when the sourness was nearly gone off, deposited both lithic acid and cream-coloured sediment ; while the evening urine, made after every symptom of sourness had been gone for some time, deposited the cream-coloured sediment, but no lithic acid. The sandy deposition of the two first portions of this day's urine amounted to gr. j1-2. On each day of the above experiment, the exercise was equal, and taken at the same time of the day.

Saturday.

Thermometer at 11, A. M. 33° ; at 3, P. M. 33° ; at night, 35°.

Sunday.

In the morning, thermometer 36° : in the evening, 37.

EXPERIMENT III.

Was made on the same boy.

Thursday.

He emptied the bladder on getting out of bed at 8 o'clock.

At 9, he took for breakfast,

of beef, oz. ij. dr. ij.

of bread, oz. j.

At 11, he set apart of urine oz. iv. (thermometer 38°)

At 3, he set apart of urine oz. vj. (therm. 38°.)

At half past 3, he took for dinner,

of mutton, oz. vij.

of potatoes, oz. vj.

of small beer, oz. iv.

At half past 8 he made of urine oz. ij. and took nothing to-day after dinner-time; at night he complained of sickness, from having lived so much on animal food. After each portion of this day's urine had stood about 48 hours, in all of them there was cream-coloured sediment, but no crystals of lithic acid.

Friday.

The bladder was emptied as usual at 8 o'clock; his breath to-day had a sour smell, which infected the air of his bed-room.

At 9, he took for breakfast,

of mutton,

of bread,

of water, *sing.* oz. iv.

At 11, he set apart of urine oz. iv. (thermometer 37°)

At 3, he set apart of urine oz. v. (thermometer 37°.)

At half past 3, he took for dinner,

of mutton, oz. iv.

of potatoes, oz. vj.

of water, oz. iv.

At half past 7, he set apart urine oz. vj.; the sourness of his breath went off towards the evening. After each portion of this day's urine had stood about 48 hours, I found in that made in the morning about gr. 3-4 of lithic acid, but no cream-coloured sediment; in that at 3 o'clock, p. m. gr. j. of lithic acid, no cream-coloured sediment; in the last no lithic acid, but some cream-coloured sediment. The exercise taken on each day of this experiment was equal.

I found constantly in this boy, that after he had lived a day chiefly or entirely on animal food, although there were no symptoms of acidity that night; yet by next day these were always very evident; this acidity producing the same effects on the urine, as acid *ingesta* do. The effect went off toward the evening, the acidity of the breath also going off. It appears, therefore, that the acidity was some way or other produced in the night

time, when the boy used a diet chiefly composed of animal food. The check given perspiration by the sickly state which was induced by the use of such food, in a person accustomed to a very different manner of life, seems to have had a great share in producing these effects on the urine, as will afterwards appear.

EXPERIMENT IV.

Was made on the same boy mentioned in the last.

First Day.

He got out of bed at 8 o'clock in the morning, and emptied the bladder.

At 9, he took for breakfast,

of boiled beef, oz. iiijl-2

of water, oz. iv. (therm. 44°.)

At 11, he set apart of urine oz. viij.

At 3, he set apart of urine oz. viij.

At half past 3, he took for dinner,

of boiled beef, oz. v.

of water, oz. iv.

At half past 8 in the evening, he set apart of urine oz. viij. (therm 46°.) He eat nothing after dinner, complaining of sickness and a great distaste for animal food. His drink this day was only oz. viij, while his urine was lb. j. oz. viij; so much in this case also did his manner of living check perspiration. I examined each portion of this day's urine about 48 hours after it was made. In all there was cream-coloured sediment, but no crystals of lithic acid.

Second Day.

As usual, he got out of bed at 8, and emptied the bladder; he still complained of a great distaste for animal food, and some degree of nausea; his breath was sour. I prevailed on him, however, to live for this day as he had done yesterday; he therefore took for breakfast,

of cold boiled beef, oz. iiijl-2

of water, oz. iv.

At 11, he set apart of urine oz. vj. (ther. 46°.)

At 3, he set apart of urine oz. vj. (thermometer 46°.)

At half past 3, he took for dinner,

of cold boiled beef, oz. ij.

of water, oz. iv.

He took nothing after dinner, till past 8 in the evening, at which time he again set apart of urine oz. vj. (therm. 46°.) All his drink this day amounted to oz. viij. ; his urine to lb. j. oz. ij. I poured off the three portions of this day's urine each 48 hours after it had been made ; in the morning urine I found some crystals of lithic acid ; in the second portion I also found crystals of lithic acid ; and in the third a very few ; in none was there any cream-coloured sediment. The result of this part of the experiment is very striking. On the first day, when there was no acidity present, all the three portions of urine deposited the cream-coloured sediment, but not the least particle of lithic acid : on the second day, when there was much acidity present, the urine exhibited just the contrary appearances ; every portion of it containing crystals of lithic acid, but no cream-coloured sediment. The crystals of lithic acid found in the three portions of this day's urine amounted to gr. j.

Third Day.

The thermometer stood this day at 47°

Fourth Day.

Having got out of bed, and emptied the bladder at 8 in the morning ;

At half past 8, he took

of lemon juice, oz. j.
of sugar, oz. 1-2.

At 9, he took for breakfast,

of milk, oz. iiij.
of bread, oz. viij.

At half past 11, he set apart of urine oz. iiij.
(therm, 46°.), and took

of lemon-juice,
of sugar, *sing.* oz. j.

At 3, he set apart of urine oz. iiij. (ther. 46°)

As his urine had been so scanty, I made him drink between 11 and 3 o'clock,

of water, oz, viij.

At half past 3, he took for dinner,

of apple-dumpling, oz. xij.
of sugar, dr. vj.

Immediately after dinner he took,

of lemon-juice,
of sugar, *sing.* oz. j.

At half past 6, he took,

of bread, oz. vj 1-2.
of milk, oz. viij.

At half past 8, he set apart of urine oz. iij. (thermometer 44°). All the urine of this day amounted to oz. ix. ; his drink, including lemon juice, to lb. j. ox. xiv. so much had the lemon-juice and vegetable diet increased the excretion by the skin, for he had no stool this day. When we compare the proportion the drink bears to the urine on this day, to what it bore to that excretion on the two former days, we perceive a very striking difference. I poured off each day's urine, 48 hours after it was made, and found in each a little lithic acid mixed with much cream-coloured sediment.

Fifth Day.

He lived exactly as yesterday, each meal consisting of exactly the same food ; he also took the lemon-juice and sugar, as yesterday, and in the same quantity ; at 11 o'clock A. M. he set apart of urine oz. iij. ; at 3 P. M. of urine oz. iv. ; and at half past 8, of urine oz. v. His body was still rather costive ; (therm. in the morning 44°, in the evening 45°.) his urine this day amounted to oz. xij. ; his drink, which was always water, (except where the contrary is mentioned) being lb. j. oz. iij ; his exercise was equal on each day of this experiment. I poured off each portion of this day's urine, 48 hours after it was made, and found in all of them much cream-coloured sediment, but no crystals of lithic acid.

Sixth Day.

Thermometer during this day 45°.

On comparing the result of this experiment with that of several others, it may appear at first sight singular ; but if we consider that the lemon-juice and vegetable diet acted here as powerful diaphoretics, and consequently that the acid passed by the skin, (for it will afterwards be shown that this organ secretes an acid from the blood, even by insensible perspiration) we shall not find it contradict the result of any of the other experiments. I also found that a quantity of apples produced the same effects on this boy, whose perspiration was naturally very vigorous. And on making him eat a considerable quantity of honey, (two ounces twice a day) and at the same time live on vegetable food, he complained of acid eructations ; and it was evident that this acid also acted in the same manner as the fruit had done ; his urine being very scanty, when compared to the quantity of drink he took ; containing much cream-coloured sediment, and few or no crystals of lithic acid.

This experiment clearly shows how little acescent *ingesta* dispose the urine to deposite lithic acid, where the action of the skin

is vigorous. And from this, as well as the two preceding experiments, and one still more decisive, afterwards to be mentioned, we learn, that no abstinence from such food takes off the disposition to deposit this acid, when the action of the skin is much diminished.

EXPERIMENT V.

WAS also made on the same boy.

Monday.

He rose as usual, and emptied the bladder at 8 in the morning.

At 9, he took for breakfast,
 of beef,
 of potatoes,
 of small beer, *sing.* oz. iv.

At 11, he set apart of urine, oz. iij (ther. 39°)

At 3, he took for dinner,
 of salt fish,
 of potatoes,
 of small beer, *sing.* oz. iv.

At 6, he set apart of urine oz. ix. (ther. 38°) having made none since 11. About 48 hours after they were made, I examined each portion of this day's urine, and found in both some cream coloured sediment, but in neither any crystals of lithic acid.

Tuesday.

He lived this day in his ordinary manner, (*h. c.* eating animal food once a day) that the effects of his diet on the former might go off.

Thermometer this day 35°

Wednesday.

He rose at 8 o'clock, and emptied the bladder.

At 9, he took for breakfast,
 of bread,
 of milk, *sing.* oz. viij.

At 11, he set apart of urine oz. iv. (ther. 33°)

He took for dinner,
 of apple dumpling, oz. xvj
 of sugar, oz. j.

At 6, he set apart of urine oz. viij. having made none since 11,

as on Monday, (therm. 32°) ; his exercise on each day of this experiment was equal. After each portion of this day's urine had stood about 48 hours, I found in both some cream-coloured sediment, and a deposition of lithic acid, which amounted, on the whole, to nearly gr. j.

Thursday.

Thermometer 32° .

Friday.

Thermometer 29° .

EXPERIMENT VI.

THIS experiment was made on a young man about 20 years of age, and in good health.

He breakfasted, dined, and supped entirely on vegetable substances and milk ; at breakfast time he ate a lemon, at dinner-time another, and a third in the evening. At 6 o'clock in the evening, he set apart a certain portion of urine, and at 10, another ; after each had stood 24 hours, there was deposited from them of lithic acid gr. ij.

Next day he eat no lemons, and dined chiefly on animal food ; at the same times of the day he set apart the same quantities of urine. After each of these had stood 24 hours, neither had deposited any lithic acid.

His exercise was about equal on each day of this experiment.

EXPERIMENT VII.

WAS made on the same person.

First Day.

He breakfasted on beef and bread. For dinner, he eat of pork, beef, and bread. For supper, beef and bread. He set apart no urine this day.

Second Day.

He did not complain of his manner of living, nor were there any signs of acidity, as in the boy, from a similar diet.

He took for breakfast, beef and bread ; for dinner, of rabbit, beef, and bread.

Morning, mid-day, and evening he set apart of urine oz. iv. (thermometer this day 39° .) After each had stood about 48 hours there was in all some cream-coloured sediment, in none of them any crystals of lithic acid.

Third Day.

Thermometer 39° .

Fourth Day.

Thermometer 35° .

Fifth Day.

Having eat a lemon last night, he lived this day entirely on vegetable substances ; except that at dinner-time he took some broth, in which flesh had been boiled : he also eat two lemons. He set apart no urine this day.

Sixth Day.

This day he lived as yesterday, eating 3 lemons, one in the morning, a second at mid-day, and a third in the evening ; at which times also he set apart portions of urine, each as formerly, oz. iv. (thermometer this day 39° .) Having examined these portions of urine about 48 hours after they were made, I found in all of them crystals of lithic acid ; which, put together, amounted to about gr. j1-2. In none of them was there any cream-coloured sediment.

Seventh Day.

Thermometer 39° .

Eighth Day.

Thermometer 39° .

His exercise was equal on each day of the experiment.

EXPERIMENT VIII.

WAS made on myself, when in good health.

First Day.

Having made water at 8 o'clock on getting up, which I did not keep,

At 9 o'clock, A. M., I took for breakfast,
of beef,
of water, *sing.* lb. 1-2.

At 12, set apart of urine, oz. vj. (thermometer 37°.)

Took about this time, of water, oz. iv.

At 3, took for dinner,
of fish, oz. vij.
of beef, oz. ij.
of water, oz. vj.

At 5, set apart of urine oz. iij. (therm. 37°.)

This day the drink and urine were nearly equal ; the depositions of this day's urine are mentioned with those of the next.

Second Day.

Having got up about 8 in the morning, and emptied the bladder,
At 9 I took for breakfast,

of milk and water, oz. x.
of bread, lb. j

At 11, I eat a lemon ; and at 12 another.

At 1, I set apart of urine oz. vj. (thermometer 35°.)

Took for dinner,
of milk,
of bread, *sing.* lb. j.

At 5, set apart of urine oz. iij.

The urine of this day was nearly equal to the quantity of liquid taken. The exercise on both days was equal.

Two days afterwards, I examined all these portions of urine at the same time ; in those of the first day, although they had stood three days, I found only five crystals of lithic acid ; in the second day's urine which had stood two days, I found about 120 such crystals ; in neither day's urine was there any cream-colored sediment.

The experiments which have now been related, are sufficient to show, that considerable changes in the manner of living produce very evident changes in the state of the urine ; but these

appear from more trifling changes of diet; having repeatedly observed, that a single meal or two, more or less acescent than usual, provided it be so to a considerable degree, affects very sensibly the state of the urine.

It is sufficient to relate the following instances, which I have seen confirmed by a great number of others.

EXPERIMENT IX.

WAS made on a young man aged 19 years, and in good health; living partly on vegetable, and partly on animal food; he set apart about 2 o'clock in the afternoon a portion of urine; next day he breakfasted as on the foregoing, and took about the same degree of exercise; after breakfast he eat about lb j^l-2. of apples; and at 2, as on the preceding day, set apart the same quantity of urine. After each had stood about 72 hours, I found in the latter of lithic acid gr. ij. in the former of the same, gr. j.

EXPERIMENT X.

WAS made on myself, when in good health.

I supped chiefly on bread and milk. Next morning I breakfasted on the same; and after breakfast eat some acescent fruit. About 2 o'clock in the afternoon. I set apart a portion of urine, which, after standing 24 hours, had deposited of lithic acid gr. j.

Next night I supped entirely on beef and bread; the following morning I breakfasted on the same; and at 2 o'clock P M set apart a portion of urine equal to what I had done the day before. After standing 24 hours, it had deposited no crystals of lithic acid.

The foregoing experiments are sufficient to prove that acidity of the *primæ viæ* (*cæteris paribus*) increases the tendency of the urine to deposit the lithic acid. From the following it appears, that, by whatever means we increase the excretion by the skin, the tendency of the urine to deposit the lithic acid is diminished. Before entering on these, however, it will be proper to relate the following experiment, as it renders the result of those I am afterwards to mention more conclusive.

EXPERIMENT XI.

IS perhaps unnecessary, as every one is ready to admit that diluents, *cæteris paribus*, will diminish the quantity of lithic acid found in any given portion of urine.

Von. H.

K k k

But as it is necessary to take nothing on this subject for granted, I made the following experiment, which I have had frequent occasion to repeat with a similar result.

In the evening, I drank lb. j. of milk, and another of water; next morning, on getting out of bed I set apart a certain portion of urine; from this time till between 2 and 3 o'clock in the afternoon, I drank lb. j. of milk, and iij. of water, and at this time set apart a portion of urine. After each of these had stood 48 hours, the sediment of lithic acid found in them amounted to gr. j1-4. A night or two afterwards I drank lb. j. of milk, and next morning set apart a portion of urine equal to that set apart on the first day. From this time till between 2 and 3 o'clock in the afternoon, I drank lb. j. of milk, and lb. 1-2. of water, and at this time again set apart a portion of urine equal to that of the former day. After each had stood 48 hours, they contained a sediment of lithic acid, amounting to gr. ij1-4.

My exercise and diet were similar on each day of this experiment.

I meant now to have tried the effect of exciting the action of the kidney by diuretics, and for this purpose took a quantity of cream of tartar. But I soon found that I could draw no conclusion from such an experiment: for if the urine were not much increased, we could not be certain of the diuretic having taken effect; if it were, there would be too much watery liquor separated, to leave it possible to judge with any degree of certainty concerning the quantity of lithic acid it contained. But I am inclined to think, for reasons which will afterwards appear, that increasing the action of the kidney by diuretics, increases the quantity of lithic acid discharged by urine.

EXPERIMENT XII.

NOT only shows how much the deposition of lithic acid from the urine is increased by indolence which checks the perspiration; but also that this matter may be deposited from the urine in considerable quantity, independent of all acid *ingesta*.

I was sometime ago attacked by rheumatism, chiefly confined to the right side of the head, and right shoulder, unaccompanied with any degree of pyrexia. This affection was so severe, and continued for so long a time, that it confined me to bed for near five weeks, during which time I lived on beef-tea, and calf-foot jelly; any other food aggravating the pain of the head. Yet, during this confinement, my urine deposited much more lithic acid than when I had taken my usual exercise, and lived on much more acescent diet. Having kept about half a pound of it 24 hours, I found that it had deposited about gr. ij. of lithic acid.

This I repeated at least half a dozen of times with a similar result. After I had recovered from my indisposition, and renewed my usual exercise, I found that the above quantity of urine, kept the same time, deposited about gr. 3-4 of lithic acid, often less, and hardly ever more. This I also often repeated; nor indeed have ever found my urine deposit so great a quantity of lithic acid as gr. ij. from half a pound in 24 hours, while I was taking exercise, however aescient my diet was. This fact might perhaps be partly attributed to the kidney, during indolence, separating less watery liquor, and hence more lithic acid in a given portion of urine. But that the appearance is not explained by such a supposition, is clear from this, that, with a view of determining the point, having taken much diluent liquor, I still found my urine deposit more lithic acid than when I was using exercise and taking less diluent liquor. That we must attribute the abundance of the lithic acid in this case to the check given perspiration by indolence, will appear evident, from what is related in Experiment xiv.

These observations account for the following remark of Scheele's: (it is made in the last number of his treatise on the calculus vesicæ.) "It is remarkable, that the urine of the sick is more acid, and contains more animal earth than that of healthy persons."

The result of the experiment now related, is confirmed by the following.

EXPERIMENT XIII.

WHEN in good health, I repeated the last experiment, as follows. I remained at home two days without exercise, and found that half a pound of urine made on the second day, and kept 24 hours, deposited near gr. ij. of lithic acid, *h. e.* above double the quantity it did when I was taking exercise, and using a similar diet. Having had often occasion to be confined since I began these experiments, either by business or indisposition, I have seen the result of the two last confirmed a great number of times; so that I regard it as well ascertained, that, *ceteris paribus*, the quantity of lithic acid deposited by the urine, is inversely as the quantity of exercise.

Nor is this all; for I have constantly observed that, by avoiding exercise, the urine not only deposited more lithic acid than usual in the mean while, but continued to do so for some time after I had returned to my usual exercise. This I particularly attended to, in the two cases mentioned; in the latter of which, for two days after returning to exercise, my urine deposited more than its usual quantity of lithic acid, and in the former, for no less a time than upwards of two weeks. These appearances are much connected with the state of the stomach; hence probably they

are most remarkable in those whose stomachs are most readily affected by indolence : but there are also other causes acting here, which tend to produce the above mentioned change on the urine, and which will appear, I think, fully explained in the sequel. I shall only at present remark, that this effect of indolence cannot be accounted for by supposing that the weakness of the stomach produces much acid in the *primæ viæ*, (which has already been shown to increase the deposition of lithic acid from the urine,) and hence a greater than ordinary quantity of lithic acid in the urine ; for in Experiment xii. we have seen the same effect take place where little aliment was used, and that entirely animal.

EXPERIMENT XIV.

IN this, and the three following experiments, it is shown, that sudorifics or medicines promoting sensible perspiration, diminish the deposition of lithic acid from the urine.

In the illness I have already mentioned, (Experiment xii.) I repeatedly found that half a pound of urine, when kept 24 hours, deposited about gr. ij-l-4. of lithic acid, although, as was formerly observed, my diet was not in any degree acescent. With a view of removing my complaint, I took scr. j. of Dover's powder. After I had submitted myself to the brisk operation of this sudorific for 12 hours, while the sweat still flowed copiously, I set apart lb. j. of urine, all I had made this day, which, after standing 24 hours, had deposited no lithic acid at all. I again examined my urine after the effects of the sudorific were over, and found that it now deposited as much lithic acid as before I had taken the Dover's powder. The above change, therefore, on the urine, I could only attribute to the increased action of the skin. I had drunk, indeed, that day more than usual ; but my urine was not more diluted ; its quantity was not greater than usual, the superfluous moisture running off by the skin.

EXPERIMENT. XV.

THIS I had an opportunity of making on a man aged 50, and who had rheumatic pains in the joints of the lower extremities.

In the morning he took scr. j. and gr. vj. of Dover's power. In about half an hour the sweat broke out, and continued to flow freely all day ; as he did not complain of thirst, I allowed him to take only his usual quantity of drink, which did not much exceed lb. j. He had now been in a profuse sweat from 9 in the morning till 6 in the evening, at which time he set apart oz. vij. of urine, while the sweat still flowed copiously. This I kept for 4 hours, without finding it had deposited any lithic acid ; I found

in it, however, much cream-coloured sediment ; his urine this day was less than half the usual quantity.

Next day, when he was going about as usual, for his complaints did not confine him, at the same time of day (6 o'clock in the evening) he set apart a similar portion of urine ; this I also kept for 48 hours. and found in it at the end of that time, a copious sediment of lithic acid, weighing above gr. iij. He had taken about the same quantity of liquid this day, as on the former, his urine being much more copious.

EXPERIMENT XVI.

ABOUT 8 months after I recovered from the above mentioned illness, I submitted myself to the following experiment, when in good health.

In the evening I took gr. ij. of Dover's powder. Next morning I took gr. vj. more ; about half an hour after this, the sweat broke out, and continued till 7 o'clock in the evening. Between 3 and 4 in the afternoon, during the sweat, I set apart a portion of urine, and between 6 and 7, another, while the diaphoresis still continued. From morning till this time, I had drunk lb. ij. of milk and water ; my urine being only lb. j. Each of these quantities of urine I examined, after it had stood 24 hours, and found that the lithic acid which they contained amounted only to gr. 1-4.

Next day, I treated myself in the same way ; except that I underwent no diaphoresis. I took no exercise, and drank about lb. ij. of milk and water : my urine this day did not exceed lb. j. during the time of the experiment, viz. from three in the morning till 7 in the evening. The small quantity of urine was probably owing to the great abstraction of moisture, which had taken place the day before ; it was fully equal, however, to what I had made that day ; my food also this day was similar to what it had been on the former. At the same times of the day, I set apart similar portions of urine ; on examining them, each 24 hours after it had been made, I found in them a deposition of lithic acid, weighing gr. iij. or twelve times the other deposition. Notwithstanding the greater deposition from the urine of the last day, that of the first was darker coloured.

EXPERIMENT. XVII.

WAS made on the man mentioned in Experiment xv. ; after he had recovered from his late complaints, and engaged in his usual occupation as a day-labourer ; only troubled with two or

three biles, a topical affection, and consequently of no importance in influencing our conclusions from the following experiment.

On Sunday morning, he took scr. j. of Dover's powder.— After he had sweated 5 hours, he set apart a certain portion of urine. From morning till this time, he had drank rather more than usual ; but his urine was hardly equal to what he generally made.

On Tuesday, when engaged in his usual business, (that of a day labourer) he set apart, at the same time of the day, another portion of urine. Both of these I examined on Wednesday morning. Now the whole urine made on Sunday was hardly equal to that made on Tuesday ; but the quantity set apart on Sunday was greater than that set apart on Tuesday. He had taken no exercise on the former day, on the latter he had taken a great deal. The urine set apart on Tuesday had not stood 24 hours ; that set apart on Sunday, nearly three days. Yet in this I found only 21 particles of lithic acid, a quantity hardly sufficient to turn a nice ballance ; while, in the Tuesday's urine, there was a deposition of lithic acid, weighing gr. j1-2., a dozen or more times the other deposition.

The foregoing cases show, in the most unequivocal manner, that, by exciting sweat, we diminish the quantity of lithic acid found in the urine. Although these are the only cases of this kind of which I have notes, yet I have seen the same effect produced by sudorifics at other times, having never examined the urine, during their operation, without observing it.

The following experiments were made with *diaphoretics*, or medicines increasing insensible perspiration only.

EXPERIMENT. XVIII.'

THE person mentioned in Experiment ix. underwent the following, when in good health.

He took in small doses, from 12 o'clock at noon till 6 in the evening, gr. j.1-2 of tartar emetic. At 10, in the same evening, he set apart a portion of urine. This stood 24 hours without depositing any lithic acid.

Next night, at the same time, he set apart an equal portion of urine ; after it had stood only 12 hours, I found in it a sediment of lithic acid.

He used similar diet and exercise on each day of the experiment.

EXPERIMENT XIX.

Was made on a boy, whom I have frequently mentioned, still in good health.

Having examined his urine in its ordinary state, I found too little lithic acid deposited from it to enable me to draw any certain conclusions, even from its total abstraction ; I therefore made the experiment on him in the following manner.

When living in his usual way, except that he took rather less exercise, I made him eat four apples after breakfast ; and about 2 o'clock P. M. set apart a portion of urine ; after this had stood 24 hours, it had deposited gr. j of lithic acid.

Next day, he lived exactly as on this, except that he took from morning till noon, in small doses, gr. j of tartar emetic ; which produced no sensible effect. About 2 P. M. he again set apart a portion of urine, equal to what he had set apart the day before ; after this had stood 24 hours, I found it had deposited no lithic acid at all.

EXPERIMENT. XX.

WAS made on myself, while in good health.

Living as usual, but using rather less exercise, I set apart, about 1 o'clock P. M. a portion of urine, which, after standing 24 hours, had deposited a little more than gr. ij. of lithic acid.

Next day I took, in small doses, from morning till mid-day, gr. j. of tartar emetic ; this occasioned such a degree of nausea, that I felt a cold sweat on the forehead ; but there was no sensible perspiration on any other part of the body. On this day I used no exercise, that the result of the experiment might be the more striking ; living in every other respect as on the former day, the liquid I took being equal, but my urine less. On this day also, I set apart a portion of urine at 1 o'clock P. M. equal to that of the day before. After this had stood 24 hours, I found that it had deposited only two or three particles of lithic acid, a quantity hardly visible had it not been collected in one part of the vessel, and not to be measured by the nicest balance.

EXPERIMENT XXI.

WHILE living as usual, but taking rather less exercise, I set apart about mid-day a portion of urine, which, after standing 24 hours, had deposited gr. ij. of lithic acid.

Next day I took a smaller quantity of tartar emetic than I had done in the last experiment, not much above half a grain, which hardly produced any nausea, and lived in every other respect as on the first day of this experiment. About mid-day, I set apart a portion of urine equal to that of the day before ; which, after standing 24 hours, had deposited no lithic acid.

It is remarkable that a small dose of tartar emetic more certainly prevents the deposition of lithic acid, than a large one of Dover's powder, although producing a copious sweat ; which may be accounted for in the following manner. It will appear from what will be said hereafter, that the secretion of the matter occasioning the deposition of lithic acid from the urine, depends not upon the mere relaxation of the kidney, but upon its vigorous action. I should imagine then, that the same thing takes place in the skin, and that this matter is only separated by it, in proportion to its activity. (For it will afterwards appear, that the matter occasioning the deposition of lithic acid from the urine, passes also by the skin ; and indeed, from the experiments already related, we can hardly suppose otherwise.) Now Dover's powder, although it may in some degree increase the action of the skin, yet we must suppose that its sudorific effect is in a great measure to be attributed to the relaxation induced on that organ ; whereas antimony acts only by increasing the activity of the skin. There is also another difference in the manner in which these medicines affect the urine. While the Dover's powder produced in general no effect on the urine after the sweat had ceased to flow, the antimony continued, for several days after it was taken, in a greater or less degree, to affect that excretion. I have also repeatedly observed, that the deposition of lithic acid from the urine was not so effectually prevented by this medicine when it produced nausea, as when it produced no sensible effect on the body ; which is to be explained on the same principles ; for although nausea produces sweat, this is evidently owing to the relaxation it induces on the skin ; and from the intimate connexion between the skin and stomach, we cannot suppose the one in a state of vigor, while the other is affected in an opposite way ; for nausea never tends to increase the action of the stomach, but evidently to diminish it ; and indeed it affects in the same manner every function of the body.

Of all the medicines we are acquainted with, there is none which more uniformly and effectually supports the excretions than mercury. By proper treatment we can generally direct its operation to the skin ; it then proves a safe and powerful diaphoretic. I had an opportunity of trying its effects on the urine in the following manner.

EXPERIMENT XXII.

A YOUNG gentleman of my acquaintance contracted a slight *sypilitic* affection, for which he was obliged to have recourse to mercury. He was a very proper subject for my observations, as I had had occasion frequently to examine his urine in various circumstances; so that I knew perfectly what changes to expect from different modes of life. I found the state of his urine at all times much affected by indolence; a pound, when he remained at home, depositing near gr. iv. of lithic acid in 24 hours, although his diet was not more acescent than usual.

When rubbing in dr. j. of strong mercurial ointment each day, staying at home without exercise, and living on vegetables alone, he sat apart oz. iv. of urine; this I kept 48 hours, and found in it no lithic acid, but a considerable quantity of cream-coloured sediment. At this time his urine was less than usual. From having treated his affection carelessly, he found it necessary to continue the use of mercury for no less than three months, during the whole of which time I examined the state of his urine; and constantly found, that, when it was much lessened in quantity, that is, when the mercury acted as a diaphoretic, it deposited no lithic acid, but much cream-coloured sediment. For the first week or two, his urine was not above the half of its usual quantity; as his stomach, mouth, and general health, however, became affected by the mercury, the urine became more copious, and deposited more lithic acid: hence it is evident, that the mercury acted at first as a diaphoretic, this effect ceasing as the debility of the system increased; and particularly that of the stomach, the vigorous action of which is ever necessary for that of the skin.

These appearances I saw take place a second time. He was persuaded to give up the mercury for some time, and try the effects of a pretty full diet. He became better in his general health; (for the affection under which he laboured was too trifling to affect this) and, on returning to the use of mercury, the same scanty urine took place, together with the same deficiency of the lithic acid, and increase of the cream-coloured sediment. These effects, however, were neither so great nor permanent at this time as formerly; his stomach too and general health became sooner affected.

After he had remained at home for about three weeks, the mercury seemed to act as a diuretic. The urine was then of a lighter colour, in greater than usual quantity, and deposited less lithic acid; undoubtedly owing to the greater proportion of watery liquor present.

Before I leave this case, it is necessary to remark, that when the urine was so scanty, the body was rather costive than otherwise. I also found in the person now mentioned, that applying

mercury in the form of ointment to the skin, tended more to promote perspiration. than taking it by the mouth; although the latter did not produce the least cathartic effect; a circumstance probably owing to the mercury taken in this way producing a greater degree of dyspepsia; which, in this patient, it always did.

The effects of mercury on the urine, when acting as a diaphoretic, are further seen in the following experiment.

EXPERIMENT XXIII.

WAS made on the boy whom I have frequently had occasion to mention, still in good health.

First Day.

He rose at 8 o'clock in the morning, and emptied the bladder.

At 9, he took for breakfast,
 of bread,
 of milk, *sing.* oz. viij.
 of honey, oz. j.

At 11 in the forenoon, he set apart of urine oz. vj. (thermometer 39°.)

At 3, he set apart of urine oz. vij. (thermometer 39°.)

At this time, he eat of honey, oz. j.

At half past 3, he took for dinner,
 of sour cream, lb. j.
 of bread, oz. xj.
 of sugar, dr. vj.

At 6, he made of urine, oz. iiij.; this I did not keep.

At 7, he took,
 of bread, oz. vj.
 of milk, oz. viij.

He set apart at half past 8, of urine oz. iiij.

All his urine this day was oz. xix. his drink lb. j. and lb. j. of sour cream which was semifluid. I poured off each portion of this day's urine, after it had stood 48 hours, and found in all some cream-coloured sediment, and some lithic acid; the latter amounting to gr. 3-4.

Second Day.

He emptied the bladder, on getting out of bed, at 8, as yesterday.

At 9, he took for breakfast,
 of bread, oz. x1-2.
 of milk, oz. viij.

of honey, oz. j.

At 11, he set apart of urine oz. vj. (ther. 32°)

At 3, he set apart of urine oz. vj. (thermometer 33°.)

At this time, he took of honey oz. j.

At half past 3, he took for dinner,

of sour cream, oz. xij.

of bread, oz. x.

of sugar, oz. j.

At 6, he took,

of bread, oz. vij.

of milk, oz. viij.

At half past 7, he set apart of urine oz. vij. (thermometer 33°.)

He took nothing more to-day. His urine this day was oz. xix.; his drink lb. j. besides the cream. After each portion of this day's urine had stood 48 hours, I found in all of them a little cream-coloured sediment, with a considerable quantity of lithic acid, amounting to gr. j1-2.

Third Day.

Thermometer this day 33°.

Fourth Day.

On the evening of this day, he took a mercurial pill; which he continued to do morning and evening, for four days.

Fifth Day.

This was the morning of the fifth day since he began to take the mercury, which he continued to do to the end of the experiment.

He rose out of bed, as usual, and emptied the bladder at 8 o'clock in the morning.

At 9, he took for breakfast,

of bread,

of milk, *sing.* oz. viij.

of honey, oz. j.

At 11, he set apart of urine oz. v. (ther. 38°.)

At 3, he set apart of urine, oz. v. (ther. 38°)

His mouth to-day was not affected.

At 3, he eat of honey oz. j.

At half past 3, he took for dinner,

of apple dumpling, lb. j. oz. v.

of sugar, oz. j.

At half past 5, he made of urine oz. iij. ; which was not kept. At this time he had one natural stool.

At 6, he took of bread oz. iv.

of milk, oz. viij.

At 8, he set apart of urine oz. ij. ; his whole drink this day amounted to lb. j. not including a considerable quantity of moisture in the dumpling, his urine to oz. xv. ; he took nothing more this night but oz. iv. of milk. After each portion of this day's urine had stood 48 hours, I found in all of them cream-coloured sediment ; but in none was there any lithic acid.

Sixth Day.

His mouth to-day was a little affected, but there was no sensible salivation.

He rose this morning as usual, and emptied the bladder at 8 o'clock.

At 9, he took for breakfast.

of bread,

of milk, *sing.* oz. viij.

of honey, oz. j.

At 11, he set apart of urine oz. iij.

At 3, he set apart of urine oz. vj (thermometer 36°.)

At this time he took of honey oz. j.

At half past 3, he took for dinner,

of apple-dumpling, lb. j.

of sugar, oz. j.

At 6 in the evening, he took

of bread, oz. vj.

of milk, oz. viij.

of water, oz. iv.

At 8, he set apart of urine oz. iv. (thermometer 35°.) He had one natural stool to-day.

All his drink this day was oz. xx. beside the moisture in the dumpling ; his urine only oz. xij. I examined each portion of this day's urine 48 hours after it had been made ; in the morning urine there was some lithic acid, and a small quantity of cream-coloured sediment : the lithic acid in this amounted to gr. 1-2. In the other two portions there was no lithic acid, but some cream-coloured sediment.

Seventh Day.

Thermometer in the morning, 35° ; in the evening, 34°.

The experiment now related would have been even more conclusive on a person whose perspiration was not so easily promo-

ted ; for in this boy the vegetable diet alone was sufficient to produce this effect in a remarkable degree.

M. Berthollet found that sweat contained an acid ; and there are many reasons which would incline us to believe that an acid also passes by insensible perspiration ; that this supposition is well founded, appears from the following experiment.

EXPERIMENT XXIV.

I TIED a piece of paper stained with litmus about my neck. After it had remained there 8 hours, during which time there was no sensible perspiration on any part of the body, I found it changed to a red colour. This experiment I again repeated, allowing the paper to remain applied only for four hours, and still found it changed to a red colour. In making this experiment, a piece of the stained paper torn from what was applied, was preserved, that by comparing the two pieces, the result might be the more decisive.

Urine left to itself deposits either a whitish matter rendering it turbid, which I have called the cream-coloured sediment, and this is often in an hour or two after it is made ; or crystals of lithic acid, which generally appear after the urine has remained out of the body for a longer time ; or sometimes both. In making the foregoing experiments it was easy to observe what circumstances disposed to the one or other deposition. The following observations the reader will find supported by the experiments where the cream-coloured sediment is noticed. The reason why it is not always noticed is, that when I began these experiments I neglected it as an accidental appearance ; and it was not till it had very frequently occurred that I paid particular attention to it, in order to ascertain the circumstances which influenced its appearance.

1. The cream-coloured sediment and the lithic acid were never observed in considerable quantity in the same urine ; where there was much of either, there was little or none of the other.

2. While the lithic acid was found in greatest quantity in the urine of a person using acescent diet, the cream-coloured sediment was increased by food of a contrary tendency.

3. Any cause promoting perspiration, while it diminished the quantity of lithic acid, tended to produce the cream-coloured sediment.

The following observations on the effects of acids on the urine after it is out of the body will place the result of the preceding experiments in a clearer point of view.

I learned a curious fact from an anonymous pamphlet* after the treatise in which the foregoing experiments were first published was nearly compleated. The author observes, that on adding any acid, even the carbonic, to urine, he always procured a copious deposition of what he calls the concreting acid, which is the same I have mentioned under the name of lithic acid.

This experiment I have repeated frequently, both with recent urine and that which had been kept some time, using the sulphuric, nitrous, muriatic, and acetous acids, the acid of lemons, &c., and in all instances found the result as stated in the above pamphlet.

Another effect of acids on the urine is that of changing its colour, which they redden considerably and render darker,† these effects appearing more suddenly if the temperature be raised.

If urine be exposed for some time to the elastic fluid evolved from a mixture of chalk and sulphuric acid, its colour appears somewhat reddened, and the deposition of the lithic acid is increased. But these effects are less perceptible from the carbonic, than from any other acid, except that lemon juice and vinegar seem to change the colour in a still less degree.

The strong nitrous acid excites an effervescence with urine whether recent or not, during which a permanently elastic fluid is disengaged, which precipitates the calcareous earth of lime water, and undergoes no contraction on the addition of atmospheric air. The vitriolic acid produces the same effect but in a less degree. The diluted nitrous acid occasions very little effervescence. This effect of acids also is increased by raising the temperature.

The muriatic acid excites no effervescence with urine, whether applied in its common or oxygenated state. If urine be exposed to the vapour arising from muriatic acid and calx of manganese, it is totally absorbed, but no elastic fluid is evolved; neither is any evolved on adding to the urine the acetous acid or the acid of lemons, although the temperature be considerably raised. Acids I found, while they occasioned a deposition of lithic acid, prevented the appearance of the cream-coloured sediment; and on adding an acid to urine which contained the cream-coloured sediment, this disappeared while the lithic acid was deposited, leaving the urine, formerly turbid with the cream-coloured sediment,

* This work is entitled, *A Treatise upon Gravel and upon Gout, in which the Sources of each are investigated, and effectual Means of preventing or removing those Diseases, recommended*, published in 1786.

† Vinegar and lemon juice produce the precipitation of the lithic acid without changing the colour of the urine. When the colour of the urine is darkened by any acid, that of the crystals of lithic acid produced is also darkened in nearly the same degree.

perfectly transparent. Urine containing cream-coloured sediment will not become transparent merely by standing for some time at rest, after keeping it for months without the addition of an acid I have always found it as turbid as at first. The urine which contains most cream-coloured sediment, on the addition of an acid deposits most lithic acid, and requires the longest time to become transparent.

As every acid which is mixed with the urine, produces a precipitation of lithic acid, we must infer, when we see more than usual of this acid in the urine on using acescent diet, that the acid derived from such diet acts in the same way, producing the copious red sediment we observe on such occasions. But however acid the diet may be, if we artificially increase perspiration, or if this be naturally vigorous, the acid will pass by the skin, (for it has been shown, that an acid passes even by insensible perspiration) and hence produce none of its effects on the urine.

It is a question of some importance, whether the body, by its own powers, generates an acid capable of precipitating the lithic acid from the urine; or is such an acid always derived from acescent diet? Several of the above experiments seem to show, that this acid is constantly generated in the body, independently of all acid derived from the alimentary canal; and that it may pass in great quantity by the kidney, while the person uses aliment which can produce no acidity. We have seen the urine depositing much lithic acid, when there was little food taken; and that which was entirely animal, continued not for a day or two, but several weeks.

Reflecting on what has been said, we shall find that there are three different states in which the urine may exist; indicating different conditions of its secreting organs.

The first is, when the vessels of the kidney are constricted; in this case the urine flows limpid, and deposits little sediment of any kind; we see it in this state in the cold stage of fevers, from the application of cold to the surface of the body, &c. The second is, when the urine is high coloured, but deposits little lithic acid; the kidney seems now in a state of relaxation, rather than of vigorous action: this I infer, from having always observed the urine secreted during sleep, however short a time retained in the bladder, fully as high coloured as that secreted during vigilance, when every part of the system is in greater activity; this urine more frequently contains the cream-coloured sediment, than that secreted when the kidney is most active, but less lithic acid. When the vigorous action of the kidney takes place, it forms the third state; here the colour of the urine is not higher than in the case of mere relaxation; it, however, deposits more of the lithic acid, but generally less cream-coloured sediment.

This state of the kidney is induced by any cause obstructing perspiration.

The skin and kidneys separate the same acid from the blood; when the action of the one is diminished that of the other is increased in order to prevent an accumulation of acid in the system; hence it is, that the proper action of the skin being prevented, more of this acid passes by the kidney, and consequently there is a greater deposition of lithic acid from the urine — Whether this action of the kidneys may be produced by diuretics, and the system freed from any over proportion of the acid, is a question which cannot positively be answered for the reasons given in Experiment xi. But if we consider what has just been said, we must suppose that increasing the action of the kidneys by diuretics, is better calculated to free the system of this matter, than the use of fluids acting merely as diluents, and which seem not to affect the deposition of lithic acid, except that, by increasing the proportion of fluid they render it rather less apt to be deposited: for Scheele and Bergman have shown that this acid, though in small quantity, is soluble in water.

From what I have observed in myself, as well as from other considerations, I cannot help thinking, that the kidney experiences these three states once a day, in a greater or less degree, according as the constitution is more or less irritable.

At night there is often formed some degree of a febrile state, even in the most healthy; and to this I would attribute my generally observing the urine paler in the evening than at other times of the day, except, where a diaphoretic had been used, evidently preventing the febrile state.

The second state of the kidney seems to take place during sleep, especially towards morning. During sleep, there is a relaxation of the febrile state formed in the evening; and hence one reason of the morning urine being higher coloured than that made at other times; this urine likewise most generally deposits the cream-coloured sediment. When I first began these experiments on the urine, I expected to find, according to the general opinion, that the morning urine, as being highest coloured, would also deposit most lithic acid; but repeated experiments convinced me, that this was not the case; so much the contrary sometimes happened, that having kept the morning and mid-day urine of the same day, each 48 hours, I found not above a few particles deposited from the former; while in the latter there was a copious sediment of lithic acid, and this notwithstanding the morning urine was both higher coloured, and in greater quantity.

The mid-day urine forms the third state; this I generally observed of a colour not so dark as the morning urine, nor so light as that of the evening; but depositing a greater quantity of lithic acid than either.

We must suppose the same diurnal revolution to take place in the skin. In the evening during the febrile state, it is constricted; during sleep, relaxed; and in vigorous action during the day-time. There is reason, we have seen, (Experiment xxi.) to suppose that the acid occasioning the precipitation of lithic acid is only thrown off by this organ, as by the kidney, in proportion to its vigorous action; hence there will constantly be an accumulation of acid during the night, to be thrown off the following day by the renewed vigour of the skin and kidneys.

As this acid in many, at least, perhaps in most cases, lays the foundation of calculous complaints, the foregoing observations tend to establish a fact of considerable importance with regard to the pathology of such complaints; that it is by the vigorous action of the skin and kidneys that any dangerous accumulation of acid must be guarded against, no abstinence from acescent ingesta being sufficient for this purpose.

Such is the foundation of the observations made in the 159th, 160th, and 161st pages of the first volume.

OF FEBRILE ANOREXIA.

I WAS seized, after a long confinement, with great anxiety, weakness, and complete anorexia, which lasted near four days, accompanied with considerable thirst, and failure of saliva. During the second night, having sucked an orange, in order to remove the disagreeable dryness occasioned by the want of the saliva, next day I felt nausea, and oppression referred to the stomach; which induced me to evacuate it, by irritating the fauces, about eight hours after I had taken the orange juice; I was much surprised to find it, after that stay in the stomach, unaltered and unmixed with any other substance.

It would appear from this case that anorexia is connected with a deficiency of gastric liquor. It was evident, that there was nothing in the stomach but the orange juice which had undergone no change, doubtless because there was no gastric liquor present.

We must infer from the experiments of Spalanzani and others, that the gastric liquor is the means of effecting that change which the food undergoes in the stomach; and does it not seem probable that the sensation of hunger may arise from the action of this fluid on the stomach, and that its absence is indicated by anorexia, a provision of nature which prevents us from eating at a time when no digestion could go on; by which we should only produce repeated vomiting, without receiving nourishment?

From these observations it would appear at first sight, that, by emptying the stomach of its gastric liquor, we might, at will, produce anorexia; from what has been said, as well as what I am about to mention, I believe we might; but it is very difficult to empty the stomach entirely of its gastric liquor; both because it is difficult to empty it entirely of any of its contents, and because the very act of vomiting, by the strong stimulus applied to the stomach, excites it to pour out a fresh quantity; but that anorexia can be nearly produced, and the sensation of hunger almost entirely taken away, by freeing the stomach of the gastric juice, appears from the following experiment.

Having ate nothing after dinner, nor drank any thing but water, next morning I still increased my appetite by walking. On returning home, I was very hungry, having ate nothing for above 17 hours; instead of taking breakfast, by means of luke-warm water I repeatedly excited vomiting.

The water came up clear, and only mixed with a ropy transparent fluid, such as the gastric liquor is described by Spallanzani, or as I have myself procured from the stomach of a crow.

This plainly indicated, that there had been nothing in my stomach but the gastric liquor which was mixed with the water, and in that state, without sensible taste, smell, or colour.

After I had undergone this operation, every sensation of hunger was removed, and rather a disgust for food produced, which I sensibly felt on seeing others eat. At breakfast I found myself satisfied, even to sickness, after eating half the usual quantity; this continued for several hours, accompanied with oppression referred to the stomach.

These observations strengthen the opinion, that the presence of the gastric liquor in the stomach, without such substances as are fit for combining with it, and thus destroying its activity, is a principal cause of that death which is occasioned by hunger; for anorexia, we have seen, is produced by the evacuation of the gastric liquor; and every one knows, how long a person, labouring under anorexia, will live without aliment.

The speedy acidity which took place in this experiment, is remarkable. Although the stomach was perfectly free from every fermenting substance before breakfast, as was evident from the state of what was thrown up; yet the food (bread and milk) acquired acidity in a quarter of an hour, indicated by acid eructations.

Does it not appear from this case that a diminution of the due quantity of gastric juice is at least one cause of dyspepsia? Is it not probable that in such, perhaps in all, cases of dyspepsia, the symptoms may be relieved by supplying the patient with the gastric liquor of those animals, whose food is most similar to that of man; this I was led to propose from the cases just related in a treatise above alluded to, published nine years ago.* In a thesis published at Edinburgh several years after by Dr. Scot, it is observed that an Italian physician finding every thing else fail in a dyspeptic case, had recourse to the gastric liquor of brutes, which proved successful.

To return from this digression. We have reason to believe then, that anorexia is the consequence of the secretion of gastric juice being interrupted; that it should be a symptom of fever therefore, where the parched skin, dry mouth, costive bowels, and scanty urine, indicate a general want of secretion, is what we should, *a priori*, have expected.

* An Inquiry into the remote Cause of Urinary Gravel,

APPENDIX III.*

AN
EXPERIMENTAL ESSAY
ON
THE MANNER
IN WHICH
OPIUM AND TOBACCO
ACT ON THE
LIVING ANIMAL BODY.
FIRST PUBLISHED IN
1795.

INTRODUCTION.

MANY of the first physiologists, both in Great Britain and other countries, have endeavoured to ascertain the manner in which opium acts on the living animal body ; and to their assiduity we are indebted for a vast number of experiments on this subject.

But the inferences, which one author makes from his observations, generally contradict those of another ; and the perplexity arising from this source is increased, by each having brought forward his own experiments and conclusions, without comparing them with those which had been made by others.

That I may avoid this error, I shall introduce the following paper, with a concise view of the state of our knowledge, concerning the action of opium on living animals, at the time my own experiments were begun. And, not to swell this part of the essay, by relating the arguments which each writer has used, in support of his own hypotheses, or against those of others ; or by giving any account of experiments, since proved inaccurate, I shall merely collect together the few seeming facts which remain,

* This Appendix is at the end of the 4th vol. of the London Edition.

after rejecting the useless and inconsistent observations in which they have been involved by the ingenuity of authors, and their partiality to particular opinions.

In various writers we find the effects of a moderate dose of opium on living animals accurately described ; most people have experienced them, indeed, in their own persons.

Soon after its exhibition it renders the pulse quicker and fuller, it produces relief from pain, and in most instances, tranquillity of mind and refreshing sleep.

The effects of opium, like those of other drugs, become less considerable the longer the body is accustomed to it. Every person knows what quantities of opium are consumed by the inhabitants of many eastern countries. And even in our own we are every day meeting with people who have habituated themselves to a very free use of it. I have seen a man drink four ounces of laudanum, without his perceiving from it even a tendency to sleep.

Dr. Mead is among the earliest authors who have given an accurate account of the effects of an overdose of opium.

In his Treatise on Poisons, first published in 1702, he relates the following experiment made on a dog. "When he had thus taken," says he, "as I could guess, near two drams of the solution, I watched him about an hour ; then he began to sleep, but presently started up with convulsions, fell into universal tremblings, his head constantly twitched and shaking ; he breathed short and with labour lost entirely the use, first of his hinder legs, then of his fore ones, which were stiff and rigid like sticks. As he lay snorting, to hasten his end, I was giving him more of the solution, but on a sudden his limbs grew limber and he died."

Tralles, in his elaborate work, *De Usu Opii*, gives nearly the same account of the effects of an over-dose of opium. But, as he describes these effects, such as he accidentally met with them, in the human body, his account of them is more interesting than that of most other authors. "Memini," he observes "horrendis convulsionibus affectum infantulum ; cui, per errorem, datus fuerat pulvillus, matri destinatus, granulum forte dimidium, extracti opii, habens." He quotes several other similar cases from different authors.

The convulsions, produced by an overdose of opium (it has since been observed) are of a peculiar kind. In many respects they greatly resemble tetanus. They are of that species which has been termed tonic ; have intermissions, and during these are renewed by the slightest touch. I have repeatedly seen them excited by a person walking across the room while the animal lay on the floor ; and have always observed the convulsions from an over-

dose of opium, in frogs and rabbits (the only animals on which I have made the experiment), assume the form of a true opisthotonos, without having ever perceived in them the least tendency to any other form of tetanus.

Dr. Alston, by means of the microscope, observed the velocity of the circulation suddenly diminished, on throwing a watery solution of opium into the stomach of a frog; but he has not stated accurately the time required for producing this effect.

He has also observed, that certain effects of opium, if it be given in large doses, very suddenly follow its exhibition. It has almost instantly produced sleep, relief from pain, from tenesmus, from vomiting, &c. From such observations Dr. Alston draws a very fair conclusion, that opium is capable of acting on the system in general, through the medium of the nerves to which it is directly applied.

He has likewise shown, that a solution of opium injected into a vein produces the same effects as when received into the stomach. In small quantity, it occasions no remarkable symptom; injected more freely, convulsions and death. It has been farther observed by various authors, that opium, applied to the brain, or injected into the heart and blood vessels, produces convulsions more speedily than when exhibited in any other way.

Dr. Alston found that opium thickens the blood when mixed with it out of the body. It was this probably which gave rise to the hypothesis of its occasioning death by congealing the blood in the heart and large vessels. His paper on opium is in the fifth volume of the *Edinburgh Medical Essays and Observations*.

Such was nearly the sum of our knowledge concerning the action of opium on the living animal body, when Dr. Whytt published his treatise on this subject.

In stating the additional information which he gives us, I shall pass over in silence certain conclusions, which it may seem at first sight I ought to mention. On comparing them with the observations of later writers, however, we shall find them inaccurate, particularly those relating to the manner in which opium, applied to a distant part of the body, affects the motion of the heart.

These are more generally known, and have been more frequently referred to, than perhaps any other part of his treatise, notwithstanding they were, in a great measure, invalidated by the observations of Dr. Monro, as early as 1761; and have since been completely refuted by a very accurate experiment of Fontana's, made on a large scale. As this experiment is related in the Appendix to his work on Poisons, and consequently not referred to in the General Index, it has often been overlooked.—In a treatise lately published on the influence discovered by Gal-

vani. the author, in one part of his work, builds much of his reasoning on the conclusions of Dr. Whytt, which are here alluded to.

Dr. Whitt, as well as Haller, found the motion of the heart little affected by the application of a watery solution of opium to its external surface. But the former shewed, contrary to an opinion which once prevailed, that the heart is far from being wholly exempt from the influence of opium; and, what may seem curious, he found that a solution of this drug thrown into the stomach and intestines of a frog, affects its motion more speedily than decollation and the destruction of the spinal marrow; and, on the other hand, that a large dose of opium destroys the voluntary motions of this animal in a shorter time than cutting out the heart.

Dr. Whytt farther observed, that opium thrown into the stomach and intestines of a frog, or merely applied to its abdominal muscles, produces effects less powerful and sudden than when injected into the cavity of the abdomen.

Upon the whole, he remarks, opium produces all its effects most speedily on those animals which cannot live long without a fresh supply of food and air.

By many of the experiments just alluded to, as well as by others, he confirms Dr. Alston's opinion, that opium produces many of its effects through the medium of the nerves, to which it is directly applied. To this action of opium probably is to be attributed the following fact, the last I shall mention from Dr. Whytt's treatise, namely, that opium, injected into the great intestines of a dog, affects the hinder extremities more speedily than the fore ones.

I cannot, however, conclude my observations, on what this subject derived from the labours of Dr. Whytt, without quoting from his paper the following passage, which, as far as I can judge either from my own experiments or from those of others, contains one of the justest, and, at the same time, one of the most important observations concerning the action of opium on living animals I have any where met with.

"It remains, therefore, that opium, by affecting the extremities of the nerves of the part to which it is applied, does, by means of their connection and sympathy with the brain and spinal marrow, destroy or prevent, through the whole nervous system, the operation of that power upon which depends sensation and motion in the bodies of animals." It is to be remarked that Dr. Whytt does not here speak of the sympathy of nerves, but of their connection with the brain and spinal marrow.

Not long after the publication of Dr. Whytt's treatise, Dr. Monro published his observations on the same subject, in the third volume of the *Essays and observations, Physical and Literary, of the Philosophical Society of Edinburgh*.

Dr. Monro shews, that opium applied externally produces the same effects, as when thrown into the stomach and intestines, cavity of the abdomen, or blood vessels. He observes, page 306, "The effects are, however, more speedy, where the dose is equal, when the opium is applied inwardly, than when applied outwardly, as might have been presumed from the greater sensibility and delicacy of the inward organs."

He has also shewn, that although opium, applied to a naked muscle, very suddenly destroys its power of contraction. yet, applied externally to a limb, while the skin is entire, it does not affect its muscles more speedily, or in a greater degree, than the muscles of any other part of the body.

Having observed the effects of opium on the entire animal, he wished to ascertain its effects when it acts merely on the part to which it is directly applied.

"But here," he observes, "we perceive an obvious difficulty; for if we stop the circulation in every part of the body, by cutting out the heart, or stop it in one particular part, it is evident that the animal will be dead, or the nerves will have lost their energy in a great measure, if not entirely, before the solution of opium can produce its effects in a very observable manner."

This difficulty, however, was obviated in the following manner: Dr. Monro found, in conformity with what was observed by Dr. Alston, that on pouring 30 drops of a strong solution of opium through a hole made in the abdomen of a frog, the motion of the heart is so suddenly affected that in the space of two minutes it beats with only half its usual frequency, and that, soon afterwards, all the muscles of voluntary motion are convulsed.

"Having, by this last experiment," he observes, "discovered a method by which this animal (the frog) is affected to a violent degree with opium, in a shorter time than that in which the energy of its nerves is considerably impaired, by putting a stop to the circulation; I could now determine, with certainty, whether this animal could be affected in that violent degree, through the nerves to which the opium was primarily applied, independent of absorption, and the circulation of the blood, by cutting out the ventricle of the heart and so stopping the circulation, before I poured the solution into the cavity of the abdomen; and on several trials, I found, that the animal was in this way affected as in the last experiment," (*i. e.* the animal was convulsed); "with this only difference that it required a somewhat longer time to produce these effects in the same degree."

The author, in his comment on this experiment, observes, "As the animal was convulsed, and in a short time, killed, by pouring the solution into the cavity of the abdomen, after cutting out the heart, we have undeniable evidence, that there is a possible way of applying opium, so that it may produce those effects, through the nerves, to which it is primarily applied, independent of its absorption and circulation with the blood, as Dr. Whytt, from a similar experiment, first endeavoured to prove."

Dr. Monro has also shewn, that the same effects are produced by throwing the solution of opium into the heart, while the heart itself is instantly rendered paralytic.

"When we compare that part of the foregoing experiment which relates to the heart," says the author, "with some experiments made by Dr. Whytt, where the opium was applied to its outer part, we see how greatly the delicacy of feeling of the inner side of the heart exceeds that of the outer side." And in another place he observes, "We see how suddenly the whole body sympathises with the heart."

On looking over notes which I took from his lectures in 1789, I find it mentioned, that although the aorta be previously cut, a solution of opium thrown into the heart affects every part of the body. And in a late paper, entitled, *Experiments on the Nervous System with Opium and Metalline Substances, made chiefly with the view of determining the Nature and Effects of Animal Electricity*, he observes, "Many years ago, I found, after cutting the venæ cavæ and aorta of a frog, that a watery solution of opium poured into the heart, occasioned in a few minutes convulsions in its legs; and after cutting out the heart, that the opium poured into the cavity of the abdomen affected the legs in like manner; although, in these experiments, the circulation was not only interrupted, but the greater part of the blood evacuated. I therefore then concluded, and now conclude, that opium and other poisons, even after they are mixed with the mass of blood, produce their fatal effects chiefly, and almost solely, by acting on the nerves of the heart and vascular system."

Yet Dr. Monro found, that opium, applied to the extremities, is not capable of affecting the whole system through the medium of the nerves.

But the most important point concerning the action of opium on living animals, established by this author, is its being received into the system by means of the absorbents; which, as far as I can judge, he proves incontestibly, by shewing that the effects of opium, applied to a limb, after all communication between it and

the rest of the body, by means of the nerves, is cut off, are soon felt in every part of the system.

Such are the circumstances relating to the action of opium on the living animal body, ascertained by Dr. Monro. The following conclusions which I shall give in his own words, contain the leading opinions he formed on this subject.

“ We may indeed perceive,” says he, “ that the effects of all the foregoing medicines (among which, opium is included,) when they are applied to the sound outer surface of the body, are chiefly owing to their absorption, mixture, and conveyance with the blood; since they operate as violently, and nearly as soon, when the nerves of the part to which they are applied are cut, as when they are entire.

“ If, again, they are applied to the more sensible inward surface of the *primæ viæ*, they may probably operate more speedily, and in some cases more violently, through the nerves alone, than by their being absorbed, and conveyed by the blood.

In another place he observes, “ As the opium has a surprising influence over the heart and arterious system, when directly applied to them, and these effects, though greater, are similar to the effects of this medicine when absorbed, we may infer, that when it is absorbed, mixed, and conveyed with the blood, its effects are almost solely to be ascribed to its operation on the nerves of the heart, and vessels through which it is carried; and, by analogy, the like is probable of many other medicines.”

In his 12th corollary, he remarks, “ We are to consider, that the nerves of the heart, and large branches of the vascular system, affected by medicines absorbed and conveyed by the blood, will influence by sympathy other nerves of the body, to which these medicines may not be able to penetrate through the very small vessels ”

“ But,” he observes in another of his corollaries, “ it is difficult to determine whether we are to ascribe the chief effects of opium on the sound animal to its action on the nerves, to which it is immediately applied, or to its absorption.”

I shall quote but one more observation from Dr. Monro’s paper. It deserves particular attention, (that part of it which relates to opium indeed, is suggested by what has already been said) “ That the effects of an over-dose of opium, as well as of some other medicines, on frogs, are analogous to their effects on men and quadrupeds.”

Fontana, the well known Italian physiologist, makes a similar remark. This author, among numerous experiments relating to other subjects, has made many with opium on living animals.

Only a small part of what he has done on this subject, however, falls to be taken notice of here. He does not seem well acquainted with what had been ascertained by the physiologists of this country, before he published his experiments; and frequently bestows much pains in endeavouring to prove, what has already been stated as proved by others.

His experiments, indeed, seem accurate, and many of them are made on a scale even more extensive than was necessary for ascertaining what he had in view; but he draws few conclusions; and the imperfect manner in which most of the experiments are related seldom admits of any, but those which the author makes from them.

This doubtless proceeded from his having in view to prove but one great fact, and neglecting (as every person in such circumstances is more or less apt to do) whatever did not tend to support or overthrow his favourite hypothesis. A few of his experiments deserve particular attention.

By one, made on no less than 300 frogs, he has ascertained, that opium applied to a nerve does not affect the muscles in which it terminates.

It is foreign to the plan, which, for the sake of brevity, I have adopted, to comment upon the inference that Fontana draws from this experiment, "*Que le vehicule de l'opium est la circulation du sang et des humeurs dans l'animal: et que sans elle l'opium n'exerceroit aucune action sur un corps vivant.*" It is directly contradicted by almost innumerable observations.

The following experiment of Fontana's is one of more consequence. It was alluded to when I was speaking of Dr. Whytt's Treatise on Opium. An experiment of this author suggested it to Fontana. I made (says the latter) a little opening in the skull of a certain number of frogs, through which I destroyed the brain and spinal marrow with a long pin. By performing the experiment in this way, rather than by cutting off the head, the great flow of blood which takes place in decollation was prevented; and consequently, in making experiments, frogs, with the nervous system destroyed in this way, can be more readily compared with the entire animal. Having then (he continues) made a certain number of frogs, thus prepared, swallow each a certain quantity of opium, and the same number of entire frogs swallow each the same quantity, I opened the thorax in all of them, in order to observe the motion of the heart. I observed its duration, and from time to time stimulated the crural nerves, both in the one set of frogs and in the other; and I can assert, that having used in this experiment 48 frogs, 24 with the brain and spinal marrow destroyed as above mentioned, and 24 entire, I could not perceive that the opium produced a less effect, or operated more slowly, on the one set of frogs than it did on the other.

“ Je deduis cependant, de ces resultats,” Fontana continues, “ deux corollairs tres importants : Le premier est, que le mouvement du cœur ne depend point des nerfs, ni de cet ensemble de sensations qui constitue la vie de l’animal. Le second est que l’action de l’opium s’exerce independemment du systeme nerveux.”

The former of these inferences is made from other experiments. It is plain, that the latter is not warranted by that just related. The only conclusion we can draw from it, and one indeed which it is impossible for us not to draw from it, is, that the motion of the heart is not affected by opium, applied to a distant part of the body, through the medium of the nervous system.

It is easy to count the beats of the heart, but impossible to determine accurately the state of the muscles, by irritating the nerves which terminate in them. This part of the experiment lies open to much fallacy ; and, that Fontana was deceived in the inference which he draws from it, appears from many facts related in the subsequent part of this paper.

Fontana found, in another experiment made on 24 frogs, that opium, thrown into the stomach, more speedily impairs the motion of the limbs in the entire animal, than in one with the heart cut out.

Dr. Alexander published his thesis, entitled, “ De partibus corporis animalis quæ viribus opii parent,” at Edinburgh, in 1790. He attempts to show, (contrary to what seems ascertained by several of Dr. Monro’s experiments) that opium is never received into the system by means of the absorbents.

I think it necessary to mention this attempt, because Dr. Alexander’s experiments have been made since the publication of Dr. Monro’s. But how unsuccessful it is, must appear at first view to every person who peruses the thesis.

Nobody can compare together the 52d, 54th, and 56th experiments, and read the comment which is in the 106th and 107th pages the author makes upon them, without some surprise at seeing a man of Dr. Alexander’s ingenuity permit himself to be so evidently misled.

Can it be seriously asserted, that because a frog with the spinal marrow divided, and 30 drops of a solution of opium applied to the extremities, survived another whose heart was cut out, and to whose extremities the same quantity of the same solution was applied : Can it be asserted, I say, from this experiment, that none of the effects of opium depend upon its absorption ? Is not cutting out the heart more suddenly fatal than the division of the spinal marrow ? and shall we make no allowance for this circumstance in drawing our conclusions from the experiment ?

Nor are his 59th and 60th experiments conclusive,* since opium, applied to the inferior extremities, operates very slowly on the system in general; and the injury done to frogs in these experiments, previous to the application of the opium, was very considerable.†

From some of Dr. Alexander's experiments it appears, that universal convulsions are the consequence of throwing a solution of opium into the stomach and intestines of a frog, although the heart has been previously removed. It was formerly observed, that Dr. Monro met with the same result, on injecting a solution of opium into the cavity of the abdomen, after cutting out the heart; but he speaks as if he did not meet with this result when the solution was thrown into the stomach and intestines.

Dr. Alexander shews, by many experiments, that opium, injected into the heart of a frog; or into the stomach and intestines, or under the skin, whether the heart has been previously removed or not; destroys the irritability of all the muscles of voluntary motion; but that it only produces the same effect on the muscles of involuntary motion when immediately applied to them.

He has also shewn, that if the nerves going to any limb be cut, the irritability of that limb remains after death, when the animal is killed by opium, in whatever manner applied, provided it has not been applied to the muscles of the limb itself.

As most of Dr. Alexander's experiments were made with a view to support or overturn certain hypothetical opinions, and as no inferences of consequence, except those relating to such opinions, can be drawn from them, few of this author's useful observations fall to be related here.

The last fact mentioned from Dr. Alexander's treatise is farther confirmed by Dr. Fowler, in his excellent publication above alluded to. who used, as a test of irritability of the muscles, the influence lately discovered by Galvani.

It may not be useless to present at one view, the most important facts which have been stated.

Opium, applied to any part of a living animal, soon produces an aversion to motion, and a tendency to sleep. These effects often

* Neither is Dr. Alexander's 51st experiment conclusive. The powers of absorption were probably deranged by the injury done to the part of the intestines on which the experiment was made. Besides, it was no easy matter to determine whether or not the lacteals contained a small quantity of the opium.

† Dr. Alexander was led from his experiments on this head, to conclude, upon the whole, that, although we cannot positively assert that opium is not absorbed, yet we have no proof of its being so, at least to such a degree as to kill.

take place instantly when the dose is considerable, especially if it has been applied to a sensible part of the body.*

If the dose is sufficient to endanger life, convulsions soon succeed, which consist of repeated contractions and relaxations of all the muscles of voluntary motion.† In different cases the contractions are more or less permanent.

Throwing a solution of opium into the blood-vessels produces the same effects as applying it in any other manner. A small quantity may be given in this, as in every other way, without occasioning either convulsions or death.‡ Convulsions are the consequence of throwing a strong solution of opium into the heart of a frog, whether the *venæ cavæ* and *aorta* have been previously divided or not.§ The same solution thrown into the stomach and intestines, or into the cavity of the abdomen, after the heart is cut out, produces the same effect.||

* After the brain and spinal marrow of a frog have been destroyed without much loss of blood, a solution, of opium thrown into the stomach and intestines, affects the motion of the heart as readily as when the nervous system remains entire.¶ Opium, therefore, applied to a distant part, affects the motion of this organ through some other medium than that of the nervous system.

After all connexion, by means of the nerves, between the hinder limbs and trunk of a frog, is cut off, a solution of opium applied to these limbs produces the same effects on the body in general, as when their connexion with the trunk is entire. From which we conclude, that opium is received into the system by means of the absorbents.**

When we throw a strong solution of opium into the heart, it instantly becomes paralytic; nor can its action be renewed by any irritation whatever.††

The application of this solution to the muscles of the extremities produces the same effect on them. But if every thing forming the connexion between these and the trunk, except the nerves, be divided, its action extends no farther.‡‡

* Dr. Mead.

† Dr. Mead, Dr. Alston, Dr. Trales, &c.

‡ Dr. Alston, Fontana, and Dr. Alexander.

§ Dr. Monro.

|| Dr. Monro and Dr. Alexander.

¶ Fontana.

** Dr. Monro.

†† Dr. Monro.

‡‡ Dr. Monro.

When it is thrown into the heart of a frog ; or into 'the stomach and intestines, or under the skin, either before or after the heart is removed ; it destroys the irritability of all the muscles of voluntary motion.*

Thrown into the cavity of the abdomen, it very suddenly renders the contractions of the heart less frequent,† and produces all its other effects more speedily than when injected into the stomach and intestines, or merely applied to the abdominal muscles.‡

Lastly, it operates most speedily on those animals which cannot live long without a fresh supply of food and air.||

Such may be considered the present state of our knowledge concerning the action of opium on the living animal body.

On reviewing what has been said, we still find the subject involved in much confusion.

Opium, it has been observed, so affects the nerves of the abdomen, stomach, and intestines, and those of the heart, as to act by what has been termed the Sympathy of Nerves, on every, the most distant part of the body, after the circulation is interrupted ; and yet no action of opium on the nerves of the extremities produces the same effect. And although a solution of opium, directly applied to the heart, thus affects distant parts of the body, and the motion of this organ is almost immediately influenced by injecting the solution into the cavity of the abdomen, *i. e.* far more speedily than it could be through the medium of the absorbents ; yet throwing a large quantity of opium into the stomach and intestines does not affect the motion of the heart through the medium of the nervous system.

These circumstances very nearly imply contradictions, and certainly do not tend to establish any general laws concerning the action of opium on living animals.

My reason for laying the following experiments before the public is, that they contradict many of the most essential of the foregoing circumstances ; that they remove the seeming contradictions just stated ; and that they seem to afford a very simple account of the *modus operandi* of opium on living animals ; that is, to shew on what parts of the system this drug immediately acts in producing each of its effects, and that its action on these parts does not essentially differ from that of a vast number of other circumstances.

But I do not assert, that, because they remove these seeming contradictions, and afford a more simple account of the *modus*

* Dr. Alexander.

† Dr. Monro.

‡ Dr. Whytt and Dr. Monro.

|| Dr. Whytt.

operandi of opium than those which have been related or alluded to, their results ought to be admitted.

The only means of arriving at certainty in experiments, where there is so much room for fallacy as in those I am speaking of, is frequently repeating them; and although the circumstances just mentioned tend doubtless to confirm the results of the following experiments, it is solely on this ground that I bring them forward, namely, that they have been much more frequently repeated than those from which opposite conclusions must be drawn.*

* I have explained above (vol. i, p. 108.) why Dr. Crumpe's Treatise on Opium is not mentioned in this Essay.

EXPERIMENTS, made with a view to determine the manner in which Opium acts on the Living Animal Body.

I BEGAN these experiments by repeating the most simple of those which had been made by others. Opium was applied to various parts of the entire animal, both external and internal, and the results found precisely such as various authors have stated them.

The animal constantly became affected with violent and universal spasms, which almost immediately followed the exhibition of the opium, when it was applied to the brain, or injected into the heart and blood-vessels.

After making many experiments which led to no useful conclusion, any account of which, therefore, would be improper, the following observation suggested several of those I am about to relate.

On throwing a solution of opium into the heart, I perceived it pass along the aorta towards the brain. Comparing this circumstance with the effects of opium applied to that organ, it appeared probable, that the convulsions which follow its injection into the heart and blood-vessels, are owing, not to any sympathy of the nerves of the heart with those of other parts of the body, but to the opium being conveyed through the aorta, and immediately applied to the brain. With a view to determine this point, I made the following experiment.

The solution used in the first and many of the other experiments was prepared in the following manner. One ounce of opium was triturated with two ounces of warm water, till a turbid mixture was formed; one ounce of cold water was afterwards added to it. This mixture was carefully corked, and exposed to a temperature of 90°* for 12 days. It was then filtered, and about two ounces and a half of a very strong solution obtained, which appeared almost black in a common two-ounce vial. This solution is stronger than that which was used either by Dr. Monro or Dr. Alexander. A weaker was prepared by mixing equal parts of this solution and water.†

* Of Farenheit's thermometer.

† In many of the following experiments, it is of no consequence to know the strength of the solution employed: it is not therefore attended to in these.

After the aorta was secured by ligature in 12 frogs of different sizes, a few drops of the strong solution of opium were injected into the heart of each. It immediately ceased moving.— This, however, was not followed by the slightest convulsion in any part the body.

The frogs all died in exactly the same manner as these animals do when the heart is cut out ; that is, when the circulation is interrupted, and when they lose as much blood as in this experiment. I could not perceive that the injection of the solution had any effect but that of putting a stop to the motion of the heart.

The irritability of the muscles of voluntary motion, after death, was found, in all of these frogs, as entire as it is after any death equally lingering.

A similar experiment was made in the following manner : After dividing the aorta in ten frogs, most of them full grown, a few drops of a solution of opium, (not quite so strong as that used in the last experiment) were thrown into the heart of each. Its contractions instantly ceased, but no convulsions supervened.

I have neglected, I find, to mention in my notes the degree of irritability remaining, after death, in the muscles of these frogs. I seldom or never failed to examine it, however, and I recollect, that in all experiments of this kind, that is, in which a solution of opium was injected into the heart, after dividing the aorta, or securing it by ligature, the muscles of voluntary motion were readily thrown into contractions, after death, by irritating the nerves which terminate in them.

A circumstance which occurred in making this experiment, serves, in some measure, to account for others having met with a different result from it. Having divided the aorta, as I imagined, and injected some drops of the solution into the heart of a frog, I was surprised to observe, (contrary to what happened in the experiment just related) the animal seized with general convulsions.

When I examined the part of the aorta, however, at which the cut had been made, the cause of this difference of result was apparent. I had not completely divided the artery, the two ends still adhered by a slight connexion on the inner side of the vessel ; and as the elasticity of its sides preserved its cavity, any fluid injected into the heart must in part have passed along this vessel to the brain. The consequence would have been the same, it is evident, had the cut ends of the vessel been kept applied, or nearly so, by cellular membrane, or any other means.

I accidentally observed, in more than one instance, that convulsions did not supervene, when the solution was injected into the

heart in very small quantity, and with very little force, although the aorta was neither divided nor secured by ligature. This mode of making the experiment is certainly more conclusive than either of the foregoing; since many of the nerves of the heart pass so near the aorta, that they must share its fate, when we divide or throw a ligature around this vessel.

But it is almost impossible to repeat the experiment frequently in this way with the same result. It is difficult to inject the solution in such a manner, that no part of it may pass into the aorta, or always to determine whether it does so or not.*

This, however, suggested another mode of making the experiment, which seems perfectly conclusive.

I slit the heart in six frogs. Notwithstanding its contents were thus instantly evacuated, it continued to contract with vigour. A little of the same solution used in the last experiment was then dropped into it.

No part of the solution, applied this way, can be sent through the arteries to the brain; but as almost all the nerves are left entire and uncompressed, if the convulsions which follow the injection of opium into the heart depend on any action of that drug on the nervous system, they ought to be observed in this experiment.

On the solution being dropped into the heart, it immediately ceased moving, but no convulsions supervened.

Lest it should be said, that stopping the circulation in the above-mentioned experiments, prevented the nervous system from undergoing the changes necessary for producing convulsions, the following were made.

The aorta in four frogs was secured by ligature, and the auricle wounded so as to permit the blood to escape; in other two, a ligature was thrown around all the vessels attached to the heart; and this organ was removed. The skull of each was then perforated; and, after wounding the brain in the first four, a little of the weaker solution was dropped into it. In the other two a few drops of a stronger solution were applied to the surface of the brain.

In all of them the muscles of voluntary motion were seized with violent convulsions. They died, with precisely the same

* This mode of making the experiment, although its result is not always uniform, ought perhaps to be regarded as sufficiently conclusive.—When convulsions follow the injection of the solution, we can readily account for their doing so, independently of any action of the opium on the nerves of the heart. And when they do not, how are those, who attribute these convulsions to what is termed sympathy of the nerves, to account for their absence, when the solution is injected into the heart, while the nerves of that organ, and those of every other part of the system, remain entire?

symptoms which follow the injection of opium into the heart when it passes along the aorta.

When the state of the muscles was examined after death, in the first four frogs, their irritability was found much impaired. I either did not examine the state of the muscles, after death, in the other two frogs, on which the experiment was made at a different time, or neglected to take notice of it in my notes.

The frogs used in this experiment, were of different sizes ; two of the first four were full grown.

From these experiments, then, it appears, that opium, applied to the heart, is not capable of affecting any distant part, through the medium of the nervous system.

Another perplexity, however, relating to the action of opium on the heart, still remains to be unravelled.

Dr. Monro it has been observed, found, that, by throwing a solution of opium into the cavity of the abdomen of a frog, the motion of the heart is almost immediately rendered less frequent : from which he concluded, and certainly not without reason that opium, applied to a distant part of the body, affects the motion of the heart through the medium of the nervous system.

As this conclusion, however, contradicts the result of an experiment of Fontana's, above related, which was repeated much more frequently than Dr. Monro's, I suspected that there had been some fallacy in the latter.

I therefore repeated Dr. Monro's experiment more than once, but found the result as he has stated it. The beating of the heart became less frequent; almost immediately on the solution's being injected into the cavity of the abdomen.

It was still plain, however, that both the conclusion which has been drawn from this experiment, and that which Fontana draws from his, could not be just, as they directly contradict each other.

There seemed little doubt of the justness of Fontana's conclusion. That of the other appeared more questionable. In the former it is only maintained, that a certain effect is not produced by the opium, because it is not observed to follow its exhibition. In the latter, it is not only maintained, that the opium produces a certain effect constantly observed to follow its exhibition, (an inference indeed as just as the other); but that it produces this effect in a particular way.

These circumstances led me to consider, whether or not there is any other way, in which a solution of opium, injected into the cavity of the abdomen, can be supposed to influence the motion of the heart, besides through the medium of the nervous system, or that of the absorbents.

A conjecture occurred to me, which is confirmed by several of the following experiments that opium applied to the coats of the blood-vessels, by destroying their muscular power,* must affect the circulation in these vessels; and consequently, thrown into the cavity of the abdomen, influence the motion of the heart, by impeding, or entirely interrupting, that of the blood, in nearly one-third of the whole animal; by which the supply to the heart is diminished, and a greater than usual obstacle opposed to its perfect evacuation.

The first circumstance, then, to be ascertained, is, whether opium applied immediately, or nearly so, to the blood-vessels of a living animal, impedes, or wholly interrupts, the circulation in these vessels, independently of any general affection of the system.

It is to be observed, that in the following experiment, the opium is not applied immediately to the coats of the blood-vessels, but injected into a cavity, between which and these vessels a dense membrane of cellular substance is interposed. The skin of a frog, except in a few places, (chiefly the joints) does not adhere to the parts which lie beneath it.

Having adapted the web of a frog's foot to a microscope, I injected eight or ten drops of a solution, (nearly as strong as the stronger solution,) under the skin of the leg.

In a few seconds the circulation became languid, and no motion could be perceived in some of the larger blood-vessels. It gradually became more obscure in the rest, till, in the space of about two or three minutes after the injection of the opium, it ceased altogether. Nor did this interruption of the circulation proceed from any general affection of the system, since the motion of the blood still continued in the other foot.

Lest it might be suspected that in applying the foot to the instrument, the vessels were compressed, it is proper to observe, that the circulation in the foot after it was applied to the microscope, continued as vigorous as before, till the solution was injected. On another occasion, indeed, I have observed the circulation in the foot of a frog, applied in the same way to the same microscope, continue vigorous for several hours.

This experiment was made three times, in the same manner, and with the same result.

After determining that opium is capable of interrupting the circulation in the part to which it is immediately applied, independently of any general affection of the system; all that is neces-

* Opium, it was found, destroys the power of action in all muscles to which it is immediately applied.

sary in order to ascertain whether it is in this way that it suddenly affects the motion of the heart, when thrown into the cavity of the abdomen. is to interrupt the circulation, and observe the effects of this drug applied in the same way, for then if the foregoing conjecture is just, it will no longer affect the motion of the heart.

The functions of the nervous system, it has already been observed, are not impaired in the frog, for a considerable time after the circulation is interrupted.*

I slit the heart in six frogs, so as to permit the blood to escape freely ; and in about a minute after, threw eight or ten drops of the same solution, used in the last experiment, into the cavity of the abdomen, moving the tube, with which the injection was made, in various directions, that the solution might be applied as generally as possible. Little or none was returned.

In three of the frogs, the frequency of the heart's motion was the same after as before the injection of the solution ; in the other three, it became less frequent about a minute after it.

There is room for considerable fallacy in this experiment. Cutting the heart may render its contractions more frequent than natural, and consequently their frequency will diminish more rapidly than when the heart is left entire. Besides, I always observed, that the struggles of the animal, increasing the supply of blood to the heart, increased the frequency of its contractions ; and as this supply was always becoming less, their frequency, on this account also, would be constantly diminishing. It is extremely probable, that the diminished frequency of the heart's motion, in three of the frogs, was not the effect of the opium, since it did not produce the same effect in the other three.

As it is possible, however, that some unperceived circumstances might have counteracted the effects of the opium on the first three frogs, it was necessary to repeat the experiment in a more conclusive manner.

I observed, that although, on securing the aorta by ligature, the heart is immediately distended with blood to a great degree, the frequency with which it beats after the operation, continues the same, or nearly so, for the space of four or five minutes. It is

* It may seem that I should, in the first place, have shewn, that diminishing the quantity of blood, supplied to the heart, is capable of diminishing the frequency of its contractions. An experiment of this kind is perhaps unnecessary, as the fact which it goes to prove is so generally admitted. But, that nothing may seem taken for granted, it will be found in the following experiment, that, after the ventricle of the heart was wounded, and thus a great part of the blood evacuated, the struggles of the animal, which increased the flow of blood to the heart, never failed at the same time to increase the frequency of its contractions.

increased when the animal struggles ; but there seemed no other circumstance to influence the result of the last experiment, performed in this way ; and it was easy to make allowance for this.

After securing the aorta by ligature, therefore, in six frogs, and counting the beats of the heart, eight or ten, and in some, fourteen or sixteen drops of the same solution used in the last experiment, were injected into the cavity of the abdomen, the tube being moved in various directions, as formerly. Little or none was returned.

When the animal struggled, which most of them did the moment the injection was made, the frequency of the heart's motion was for a little increased. With this exception, it continued, in all of them, to beat with the same frequency after as before the injection of the solution, for the space of four or five minutes : at the end of this time, it began to lose several beats in the minute ; but this was the consequence of securing the aorta, as I found by securing this vessel in other three frogs, without injecting any of the solution.

The inference from these experiments is, that the diminished frequency of the heart's motion, observed almost immediately on a solution of opium being thrown into the cavity of the abdomen, does not proceed from any action of the opium on this organ, through the medium of the nervous system, but from its impeding, or entirely interrupting the circulation, in nearly one-third of the whole animal.

Opium immediately applied, even to the brain itself, although it excites violent and universal convulsions in the muscles of voluntary motion, seems, from the following experiments, incapable of at all affecting the contractions of the heart.

I removed a piece of the cranium in two rabbits, about the size of a sixpence, and as much of the dura and pia mater as I could, without injuring the brain. After replacing the teguments, and joining the lips of the wound by a suture, about a drachm and a half of a solution of opium in water was injected under the skin. This mode of applying the opium to the brain, I found very convenient : it was suggested to me by a gentleman present when I made this experiment.

Soon after the injection of the opium, the animals were seized with violent convulsions. But the motion of the heart, which I examined from time to time, was not in the least affected, except that it became more frequent when the muscles of the limbs were alternately contracted and relaxed.

In the space of some hours, the animals were reduced to a state of great debility, the muscles of voluntary motion being affected with a degree of paralysis. But the motion of the heart still continued strong and regular.

I thought I felt a slight irregularity in its motion in one of these rabbits, about an hour before its death, near twenty-four hours after the solution of opium was injected. This I could not again perceive, although I frequently examined the motion of the heart afterwards.

On opening the thorax of this rabbit, a few seconds after its death, I found the heart contracting regularly. The contractions of the ventricles continued for near ten minutes, gradually becoming less vigorous. Those of the auricles were seen for a much longer time.

This rabbit had been considerably debilitated the day before the experiment, by a quantity of opium thrown into its stomach.

The other was quite healthy, and had rather more of the solution applied to its brain. It died in nine hours.

The heart of this rabbit beat strongly, and with perfect regularity, both during the spasms, and subsequent paralysis of the limbs. It was at last seized with very strong convulsions, in which it almost instantly expired.

Immediately after its death, I applied my hand to the thorax, and felt the heart beating regularly for a few seconds. Its beats, when the hand was first applied, were little inferior in strength to those of the heart of a healthy rabbit. In the other, the motion of the heart could be perceived, after death, from the outside of the thorax.

It is a curious circumstance, that at the time the animals used in this experiment, were thrown into convulsions by the slightest touch, their sensibility was so much impaired, that on running a knife through the foot of one of them, it showed no signs of pain; only starting convulsively, as it did when touched with the finger.

After removing a part of the cranium, and laying open the thorax, in seven frogs, I applied a little of a solution of opium to the brain, the muscles of voluntary motion were soon seized with the most violent spasms; but the motion of the heart continued perfectly natural, except when disturbed by the convulsions of the trunk and limbs.

It has been observed, that, during the remissions of these convulsions, a very slight irritation is capable of renewing them. But on irritating the heart, even roughly, in this experiment, I could excite no irregular contractions in it.

Dr. Monro informed me, that he had, for some years past, performed the following experiment publicly in his Anatomical Theatre.

He injected a solution of opium in water, through a hole made in the cranium of a frog, in such a manner that it passed along

the spinal marrow, and part of it came out at a hole made in the lower end of the spine. By this mode of applying the opium, the animal was instantly killed.

An experiment, in which the nervous system is so completely deranged by the action of opium, seemed well fitted for determining, whether this drug, applied to the brain and spinal marrow, is capable of directly influencing the motion of the heart. I therefore repeated the experiment in the following manner.

A hole was made in the cranium, and another in the lower end of the spine, in eight frogs; a strong solution of opium, in water, was then injected through the hole made in the cranium, in such a manner that it passed along the spinal marrow, and part of it came out by the hole in the spine.

Most of the frogs were deprived of sense and motion as soon as the solution was injected; in two or three it was necessary to repeat the injection before the same effect was produced on them; and although they all appeared for some time quite dead, in the space of two or three minutes most of them were seized with a trembling in the limbs, and some with strong spasms, which during their intermissions, were not renewed by a slight irritation, as those are which follow the application of opium to the brain only. I observed, however, that when they had not previously taken place, they were often excited by laying open the thorax. This was done in all the frogs used in this experiment; and in those in which it excited convulsions, or trembling, as well as in those in which no motion whatever in the muscles of the trunk or limbs took place, after the injection of the solution, the motion of the heart was found as vigorous as it is in healthy frogs.*

* A gentleman, who was present when I was making this experiment, having prepared a frog in the above manner, injected the caustic volatile alkali instead of the solution of opium. This also instantly deprived the animal of sense and motion; he then laid open the thorax, and shewed me the heart uncommonly pale, and its motion considerably weaker than that of the heart in a healthy rabbit. I was inclined to attribute this affection of the heart, however, to the acrid vapour of the alkali, (in which the frog was immersed, and which affected his eyes violently while we were examining the animal) being applied to this organ as soon as the thorax was laid open. I therefore laid open the thorax of a healthy frog, and exposed its heart to the same vapour, which immediately produced on it precisely the same effects. We then repeated the above experiment in the following manner. The caustic volatile alkali being injected as formerly, the animal was instantly deprived of sense and motion. It was then carefully washed, that the vapour of the alkali, after the thorax was laid open, might not be applied to the heart, which was now found as vigorous as that of a healthy frog.

The solution used in this experiment must be sufficiently strong to deprive the animal of motion, at least till the thorax is laid open ; for I found in several other trials, that the uncommonly strong spasms induced on the limbs, when this is not the case, by rendering the circulation very irregular, and often, for some seconds, wholly interrupting it, greatly deranges the motion of the heart, by gorging it with blood ; and seldom fails, more or less, to impair its vigour. So that, what at first sight might seem a paradox, a small quantity of opium, applied in this way, enfeebles the motion of the heart, while a larger quantity is incapable of at all affecting it.

The following manner of making this experiment is perhaps more conclusive : After making a hole in the cranium, and another in the lower part of the spine, the thorax was laid open, and the motion of the heart carefully observed, in seven frogs ; I then injected the solution as formerly, by which the animals were instantly deprived of voluntary motion, and appeared quite dead ; but the motion of the heart was not in the least affected ; it continued with the same frequency and vigour, as before the injection of the solution.

All the frogs used in this experiment, some time after the injection of the solution, were seized with trembling, or convulsions, in the trunk and extremities.

I may observe, by the bye, that although irritating the brain mechanically, (like the application of opium to this organ), produces violent and universal convulsions in the muscles of voluntary motion, both in frogs and rabbits ; yet I have found, that in neither the one nor the other it affects the motion of the heart.*

From the experiments which have been related, then, we arrive at this conclusion, that opium, applied to a distant part of the body, does not affect the motion of the heart, through the medium of the nervous system ; nor, on the other hand, does opium, applied to the heart, affect any other part of the body, through the same medium.

But the heart is not the only muscle which opium, applied to a distant part, seems incapable of affecting, through the medium of the nervous system.

Many considerations render it highly probable, that the same is true of all the muscles of involuntary motion, without exception. That it is so of the muscular coat of the alimentary canal, which, next to the heart, may be considered the chief of this class of muscles, appears from the following experiment.

* Fontana makes the same observation respecting frogs.

The abdomen in several healthy rabbits was laid open, and the peristaltic motion of the intestines, which became very considerable a few seconds after they were exposed to the air, carefully observed.

A large portion of the cranium was removed in another rabbit, and the brain cut across its whole depth, in three directions. A small part of it also, which, after the cuts were made, projected beyond the edges of the bone, was removed. A solution of opium in water was then injected into the brain, by means of a small tube passed in various directions through its substance.

This was immediately followed by the most violent and universal convulsions of the muscles of voluntary motion, which, in the space of a minute or two, became quite rigid, and as hard a piece of board. The animal lay with its head drawn back, its limbs extended, in short, affected with violent and complete tetanus.

In this situation, its abdomen was laid open, and the peristaltic motion of the intestines found, in all respects, similar to that observed in the other rabbits used in this experiment. I could not perceive that it was stronger or weaker, more or less irregular, in the one case than in the other.

On examining this rabbit, twenty-five minutes after the solution was injected into its brain, I found the muscles of voluntary motion quite flaccid, and the animal dead. The motion of the intestines, however, was still strong in many parts of their tract, and continued so for thirty six minutes longer, during which time I observed it. It was not again examined till forty four minutes afterwards ; the intestines were then cold and motionless.

In making this experiment, it is to be observed, that handling the intestines throws them into violent spasms, whether opium be applied to the brain or not ; and that those parts which are most exposed to the air lose their motion soonest : so that it is necessary to raise these, and examine the parts which lie beneath them, if we wish to ascertain how long the peristaltic motion continues.

This motion, I may observe, like that of the heart, is not in the least affected by mechanically irritating the brain. In this experiment, the animal must be well secured otherwise the violent convulsions, induced on the muscles of the limbs by agitating the intestines, will increase the peristaltic motion.

It has been shewn, that opium, applied to the external surface of the heart, very little, if at all, affects the muscular power of this organ ; applied, in considerable quantity, to its internal surface it immediately destroys it. In like manner, when it was applied to the external surface of the intestines, I could not be cer-

tain that it at all diminished the peristaltic motion : when it was injected into their cavity, they almost instantly became paralytic.*

On comparing the experiments which have been related, particularly the first related, with those in which opium thrown into the stomach and intestines, cavity of the abdomen, &c. is found to produce convulsions, I thought it probable, that in the latter cases, as in the former, the convulsions do not proceed from any action of the opium on the nerves of the part to which we apply it, but from its being received into the sanguiferous system, and immediately applied to the brain.

And this conjecture appeared the more probable, as the convulsions do not supervene for a considerable time after the exhibition of the opium, except when it is thrown into the sanguiferous system, or applied to the brain itself. In order to determine this point and at the same time what effect opium produces, merely by its action on the nerves of the part to which it is applied, (if universal convulsions of the muscles of voluntary motion be not this effect) I made the following experiments.

It has more than once been observed, that the nervous system of the frog is capable of performing all its functions for a considerable time after the circulation is interrupted. A full grown frog leaps about vigorously, for half an hour after the heart is cut out, by which not only the circulation is interrupted, but the greater part of the blood evacuated : And it generally continues to leap, when irritated, for more than twice that time.

All that was necessary, therefore, to determine the point in question, was to cut out the heart, or otherwise interrupt the circulation, and then observe the effects of opium applied to the stomach and intestines, or injected into the cavity of the abdomen.

This experiment has been made, it was observed, by more than one author, and the result was general convulsions of the trunk and limbs.

As some unperceived circumstances, however, might have influenced the result of these experiments, such as a small quantity of the solution of opium having been accidentally applied to the skin before the heart was removed, (see the 2d experiment with tobacco, at the end of this paper) as the experiments were made on but a small number of frogs ; and as those who made them do not altogether agree concerning the part to which the solution must be applied, in order to induce convulsions, after the heart is

* From this effect of opium on the the internal surface of the intestines, we are at no loss to account for the costiveness which attends the use of this drug.

removed, I thought it worth while to repeat the experiment on a larger scale.

After cutting out the hearts of 24 frogs, I injected a solution of opium in water into the stomach and intestines of some of them, and into the cavity of the abdomen of others.*

Those which were of the same size, generally died the sooner, the greater the quantity of opium which had been injected. Young frogs die much more readily from injuries of this kind, than those which are full grown, as may be seen from several parts of this experiment.

The manner in which all these frogs died was precisely the same: Soon after the injection of the opium, they were seized with a degree of languor, generally proportioned to the quantity injected. Most of them, to a greater or less degree, recovered from this in the space of some minutes. The languor gradually returned and increased, till the frogs imperceptibly died, without the slightest convulsion in any part of the body. I neglected to examine the state of the muscles, after death, in the fourth frog used in this experiment; in all the others, they were found to contract readily, on wounding the nerves which terminate in them.†

* Into the 1st, not full grown, 30 drops were injected; it died in half an hour: Into the 2d, not full grown, the same quantity; it died in 33 minutes: Into the 3d, the same quantity; it died in 51 minutes: Into the 4th, very young, 10 drops; it died in 25 minutes: Into the 5th, almost full grown, 30 drops; it died in an hour: Into the 6th, full grown, 30 drops; it died in 55 minutes: Into the 7th, full grown, 60 drops; it died in an hour and two minutes: Into the 8th, full grown, 60 drops also; 8 or 10 were returned; it died in 58 minutes: Into the 9th, not quite full grown, 50 drops of the weaker solution; the time of its death was not observed: Into the 10th, very young, 10 drops of the weaker solution; it died in 54 minutes: Into the 11th, not full grown, 50 drops of the same solution; part was returned; the time of this frog's death was not observed: Into the 12th, very young, 10 drops of the same solution; part was returned; the time of its death was not observed: Into the 13th, not full grown, 26 drops of the same solution; it died in 59 minutes: Into the 14th, nearly full grown, 63 drops of the same solution; part was returned; it died in 52 minutes: Into the 15th, 20 drops of a solution nearly as strong as the strong solution: Into the 16th, 15 drops of the same solution; about 3 were returned; the time of the death of neither of the two last frogs was observed.

Solutions of various strengths were injected into the eight remaining frogs; into some, a weaker, into others, a stronger solution, than that employed in any of the above cases.

† Fifty drops of a very strong solution of opium in water, considerably stronger than the strong solution, was injected into the cavity of the abdomen, of one of the last eight frogs, full grown, the heart, as in the other cases, having been previously cut out. Part of the solution was returned when the animal moved.

The foregoing experiment was repeated in the following manner. The thorax was laid open in eight frogs, and a ligature thrown around all the vessels attached to the heart: This organ was then removed, with the loss of no more blood than it happened to contain at the time the ligature was thrown around the vessels. A solution of opium was then injected into the cavity of the abdomen in all of them, through a hole made in the muscles.*

These frogs died in precisely the same manner as those used in the last experiment. The muscles of their limbs contracted readily after death, when the nerves terminating in them were irritated.

It appears from these experiments, that the effect of opium, when it acts only on the nerves of the part to which it is applied, is merely that of inducing a general languor, which, if the quantity applied be considerable, terminates in death. This effect of opium does not essentially differ from that of any other local irritation.†

From all that has been said, it appears, that the various effects of opium on the living animal body may be divided into three

For a few seconds after the injection of the solution, it leaped about with vigour; in a short time, however, it seemed incapable of leaping; and in the space of two minutes, was almost deprived of motion. It soon began to move again, and in eight minutes could leap about. Fifty-one minutes after the injection of the solution, it leaped on being much irritated. Twenty-eight minutes after this, it turned itself when laid on its back. It died in about an hour and twenty-eight minutes after the injection of the solution.

I have related this instance particularly, as it is remarkable for the great degree of languor which followed the injection of the opium, and for the length of time which the animal, notwithstanding this, survived the application of that drug.

* The solution injected into the first 6, was not quite so strong as the strong solution; that injected into the 7th and 8th, was stronger. All the frogs used in this experiment, except the 6th, were full grown. Into the 1st, 16 drops were injected: Into the 2d, 20 drops; about 2 or 3 of which were returned: Into the 3d, 16 drops; about 3 were returned: Into the 4th, 25 drops; about half was returned: Into the 5th, 8 drops: Into the 6th, 30 drops; part of which was returned: Into the 7th, 12 drops; part was returned: Into the 8th, 14 drops.

† In man it has been shewn, that a large dose of opium produces sleep, merely by its action on the nerves of the part to which it is applied; so do other local irritations (mechanical injury not excepted) though more slowly. If it be this effect of opium which Dr. Whytt alludes to, when he says, that opium destroys the power of motion in every part of a frog, as speedily after as before the excision of the heart, the observation is just. From the nature of the experiments from which he draws the conclusion, however, he does not seem to allude to this effect of it.

classes. The first, comprehending its action on the nerves of the part to which it is applied, does not differ essentially from that of any other local irritation. It is doubtful whether the first impression made on the system by the action of opium on the nerves of the part to which it is applied, has ever been sufficient to destroy life. I have never seen it produce so remarkable an effect in any other case as in one above related.

A large quantity suddenly applied to a very extensive surface, is capable, perhaps, of instantly killing animals less tenacious of life than frogs are. Many strong impressions, such as those produced by receiving a large quantity of spirit of wine into the stomach, of very cold water when the body is overheated, &c. are well known to have occasioned sudden death. It seems to be a general law of the animal æconomy, that the effects of a strong irritation are at first very violent; but if they are withstood for a short time, they are afterwards borne with less inconvenience. It has just been shewn, how strikingly true this is of the effects of opium, when it acts only on the nerves of the part to which it is applied.

The second class comprehends its effects on the heart and blood-vessels; that of increasing their action, when applied in small quantity;* and that of impairing or altogether destroying their power of action, when applied to them more freely.† In neither of these effects, however, does the action of opium differ essentially from that of many other substances. Are not most acrid substances, in small quantity, capable of exciting strong contractions in the muscular fibre, and of destroying its power of action when applied more freely?‡ Even mechanical irritation, applied in different degrees, produces the same effects.

The third class comprehends the effects which opium produces, when immediately applied to the brain; when the dose is moderate, impaired sensibility, languor, sleep; effects observed in a greater or less degree, from other gentle irritations applied to

* It has been observed, that a short time after we take a moderate dose of opium, the pulse becomes quicker and fuller; an effect, which, from the experiments that have been related, can only proceed from the opium being absorbed and immediately applied to the heart; since it has been proved that opium cannot affect the motion of this organ through the medium of the nervous system.

† It does not appear, that, by the largest dose, we can so increase the quantity of opium absorbed, as to be sufficient to destroy the muscular power of the heart, merely by its action on that organ. It may be safely asserted, perhaps, that opium never kills by destroying the muscular power of the heart, except when injected into it, or into the blood-vessels.

‡ But the tendency of different substances to increase or destroy the action of the muscular fibre is different. Tobacco, for instance, is more apt to destroy, and less apt to increase, its action, than opium.

this organ, and which we do not perceive from a moderate dose of opium, till we know from the symptoms it produces, compared with the foregoing experiments, that it has been conveyed to the heart ; from which in the course of circulation, it is sent to the brain as well as to the other parts of the body. What share its action on these parts has in producing the foregoing effects, it is impossible to say ; we have reason to believe it but trifling : it appears from the experiments just related, that no part of them is to be ascribed to its action on the heart itself.*

Opium, applied more freely to the brain, produces the same effects which most violent stimuli, immediately applied to this organ, do, convulsions and death.† But the convulsions produced by opium, it has been shewn, are of a peculiar kind.

It may appear an omission, not to rank among the effects of opium recieved into the system, those it seems to produce on the muscles of voluntary motion. In some of the foregoing experiments, the irritability of these muscles was found much impaired after death ; although the opium was not applied directly to the muscles themselves. The reason of this seeming omission will appear from the following observations.

Comparing Fontana's experiment (in which he found the irritability of the muscles as little impaired by the action of opium applied to the stomach and intestines of the entire animal, as to those of one with the heart cut out), with others which have been related, we should infer, that the presence of opium in the system scarcely, if at all, affects the irritability of the muscles of voluntary motion. From Dr. Alexander's experiments, on the other hand, we must conclude, that they are wholly deprived of their irritability by that drug, whether it be received into the system by means of the absorbents, or act merely on the nerves of the part to which it is directly applied.

Were I to trust to the accuracy of my own observations, I should dissent from both opinions. I have never found the irritability of these muscles wholly exhausted by opium, applied in any manner except to the muscles themselves. Nor have I found, their irritability so little affected by the application of opium to the stomach and intestines in the entire animal, as in one with the heart cut out.

* The increased determination of blood to the head indeed, in consequence of the stronger action of the heart, is found to dispose to sleep ; but this in the present case, may be overlooked, as the effects of the opium applied to the brain are so much more considerable.

† Opium does not always prove fatal, when it produces convulsions. I have seen a rabbit recover after violent convulsions induced by a large dose of this drug. And instances are related in the Medical Museum, in which convulsions were induced by opium in the human body without proving fatal.

Upon the whole, the result of my experiments on this part of the subject has been, that if opium occasions convulsions, it impairs the irritability of the muscles of voluntary motion; if it does not, their irritability is not in the least affected by it.

From which it appears probable, that the impaired irritability of these muscles, observed in the former case, is the consequence of the violent contractions excited in them by the irritation applied to the brain, and not of any action of the opium on the muscles themselves. In order to determine the truth or fallacy of this opinion, I made the following experiment.

After injecting either into the stomach and intestines, or into the cavity of the abdomen, I forget which, (for I have lost the notes of this experiment) of two frogs, equal in size and vigour, the same quantity of opium; the one was kept free from every thing which, during the remission of the convulsions, might tend to renew them; so that they were rendered as moderate, and the remissions as long, as possible; in the other, as soon as a remission took place, the convulsions were renewed by slightly touching it: so that, although both frogs had taken the same quantity of opium, yet the one was affected with more violent and permanent convulsions than the other.

If, then, the impaired irritability of the muscles of voluntary motion, observed after death, when an animal is killed by opium, depends on the presence of this drug in the system, the state of these muscles in both the frogs used in this experiment should be found the same. If it be the consequence, of the contractions excited in the muscles, it should be more observable in the one frog than in the other.

The latter was found to be the case, in a very remarkable degree. I do not exactly remember how often this experiment was repeated; but recollect that it was not made above two or three times; so that its result can scarcely be regarded as certain. Some other experiments have been related, however, which tend to prove the same thing.

It was observed, that both Dr. Alexander and Dr. Fowler have shewn, that if the nerves going to any limb be divided before the solution of opium is exhibited, the muscles of this limb are neither affected with convulsions previous to death, nor is their irritability found impaired after it. Yet the opium is conveyed to them, in the course of circulation, as well as to those of any other part of the body.

The test of the degree of irritability remaining in the muscles after death, which was used in the foregoing experiments, is doubtless a very gross one. A nice test in these experiments

would have been of little consequence, however ; since the irritability seems affected by circumstances so various, that, without an infinite number of experiments, we could not ascertain to what the small differences, detected by such a test, are owing.

The influence, discovered by Galvani, appears at first sight an excellent test of the degree of irritability remaining in muscles, and has been used as such ; but its laws seem at present too little known to permit us to employ it with much confidence in physiological enquiries. Instances might be adduced, in which the employment of this influence in physiological enquiries has already led to erroneous inferences, from our not being sufficiently acquainted with its laws.

The circumstances which seem chiefly to influence experiments, made on the irritability of frogs with the gross test I employed, are. *1st*, Their age, the irritability of young frogs being much more readily exhausted than that of such as are full grown. *2ndly*, Their death being sudden or lingering, the latter leaving the irritability more impaired than the former. *3dly*, The time which the frogs are kept after being brought from the fields. The more vigorous frogs are, the more irritability their muscles possess. *4thly*, Throwing ligatures around the limbs. If a tight ligature be thrown around a limb, and kept applied for twenty minutes, or half an hour, immediately before the death of the animal, all the muscles beyond the ligature are found, after its death, quite void of irritability.

This cannot be attributed to the ligature pressing on the nerves of the limb, and cutting off its free communication with the brain, since dividing the nerves does not produce the same effect. It seems to depend on an accumulation of blood taking place in the muscles, (which are always found very red) owing to its return by the veins being prevented.

EXPERIMENTS, made with a view to determine the manner in which Tobacco acts on the Living Animal Body.

THE following Experiments may be deemed an useful addition to this paper, because they tend both to confirm the results of those which have been related, and to establish some points concerning the action of tobacco on living animals.

The solution which was used in these experiments was prepared by exposing two ounces of tobacco with six ounces of water, in a phial carefully corked, to a temperature of 90°, for twenty-four hours.* It was then filtered, and near six ounces of a strong solution obtained, which appeared black in a common two-ounce phial.

A few drops of this solution were injected into the heart in four frogs, through a hole made in the auricle. The heart instantly became paralytic, and the animals were seized with the most violent trembling, and a complete loss of sense and motion in the eyes and fore-limbs; in some, the head was drawn back; and in all, every joint of the hinder-limbs was convulsively bent to the utmost; just the contrary of what happens in the extremities, when a solution of opium is injected in the same manner.

I had found from another experiment, that the frog is affected precisely in this way when the cranium is perforated, and the solution immediately applied to the brain.

After the aorta was secured in other four frogs, a few drops of the same solution were injected into the heart, through a hole made in the auricle. It was instantly deprived of motion; but the other symptoms, observed in the last experiment, did not supervene.†

* This mixture was exposed to the temperature mentioned for twenty-four hours only, as the active parts of tobacco are readily extracted by water, and I had found, from a former trial, that it is very apt to become putrid at so high a temperature.

† In the first frog used in this experiment, a circumstance occurred, which at first appeared quite unaccountable. Its eyes gradually lost their sensibility, till, in the space of about ten minutes they could not by any irritation be excited to motion. This, however, they gradually recovered and preserved, as has been mentioned. While the eyes were thus affected, the fore-limbs also were to a considerable degree deprived of motion, which they too recovered.

No trembling nor spasmodic contraction of the muscles took place ; the frogs continued to move their fore-limbs and eyes, as long, and, in short, died in precisely the same way, as frogs do that die in consequence of the heart being cut out. In one of them, which was very large, the eyes moved when irritated for about two hours.

The state of the muscles after death was not examined in the first frog used in these experiments ; in the other seven, they contracted readily, on wounding the nerves which terminate in them, except in one, which was very young, and which had lain dead a considerable time before the state of its muscles was examined.

Lest it should be said, that interrupting the circulation in the latter experiment prevented the tobacco producing the effects observed in the former, the following was made.

After the aorta was secured by ligature, and the blood permitted to escape, by wounding the auricle in three frogs, and cutting out the heart of a fourth, the cranium of each was perforated, and the solution applied to the brain.

They were all immediately seized with the most violent trembling ; their fore-limbs became paralytic, and their eyes fixed, precisely as happened when the solution of tobacco was thrown into the heart, without previously securing the aorta. Their limbs contracted readily after death, on stimulating the nerves that go to them.

These symptoms I could only attribute to a little of the solution remaining on my fingers, and the instrument employed in opening the thorax, which might have been conveyed to the mass of blood, and through this medium applied to the brain, before the aorta was secured. That this conjecture was just, appears from what happened to the other three frogs used in this experiment.

Having repeatedly washed my hands and the instrument with cold water, before I handled the next frog, very little of this affection was observed in it ; and as it was allowed to lie about ten minutes after securing the aorta, the affection was at its height before the solution was injected into the heart, by which it was not in the least increased. It gradually went off, as in the former case.

Before touching the third frog used in this experiment, I washed my hands and the instrument with warm water and soap, which entirely prevented any affection, either of the eyes or fore-limbs, in it. Neither did this occur in the last frog on which the experiment was made, when I had not been previously handling the solution.

I take notice of these circumstances, because they not only shew, how small a quantity of tobacco is capable of affecting this animal, and how readily it is received into the mass of blood, but also suggest a necessary precaution in making such experiments:

The following experiment was made, to shew the comparative effects of tobacco, applied to the intestines of the entire frog, and to those of the same animal with the heart cut out ; where it can only act through the medium of the nerves of the part to which it is directly applied.

The first pair of frogs on which the experiment was made, were young, and very nearly of the same size ; they were equally vigorous. Into the intestines of the larger, without removing the heart, twenty-eight drops of the solution were injected, the greater part of which was returned.

The frog was not examined till forty-two minutes after injection ; it was then found without any sign of life, except that, on suddenly letting fall the hinder-limbs, they were seized with a trembling motion, which lasted a few seconds. No motion could be excited in the eyes, and the fore-limbs were quite paralytic.

The heart of the other frog was removed, and twenty-two drops of the same solution injected into the intestines, very little of which was returned. This frog was affected with no trembling. It moved its eyes, when they were irritated, seventy-three minutes after the injection of the solution, and retained the motion of the fore-limbs, as long as that of the hinder ones.

When the nerves were irritated after death, the muscles contracted readily in both these frogs. More of the solution was found in the latter than in the former.

The second pair were also young : they were of the same size, and equally vigorous.

Into the intestines of the first, without removing the heart, twenty-three drops of the same solution were injected ; the half at least was returned. Twenty-two minutes after the injection of the solution, this frog was found in exactly the same situation in which the first of the last pair was found at the expiration of forty two minutes. After removing the heart of the other, twenty-three drops were thrown into the intestines ; fifty-eight minutes after the solution was injected, it moved its eyes when they were irritated. It died in the same manner as the second of the former pair. The irritability of the muscles in both remained after death.

Third pair. The result of this experiment in all respects resembled that of the last.

The fourth pair were full grown, and equal in size and vigour. The result of this experiment was again similar to that of the foregoing. The entire frog soon became affected with violent trembling. Fourteen minutes after the injection of the solution, no motion could be excited in the eyes, and the fore limbs were paralytic. The other died as the second of the other pairs

did. It moved its eyes eighty-nine minutes after the solution was injected.

As a large quantity (50 drops) was thrown into each of these frogs, the intestine gave way ; so that the solution got into the cavity of the abdomen ; and in the latter, part of it escaped by the opening at which the heart was extracted. Contractions were readily excited in the muscles of both after death.

The fifth pair were likewise full grown, and both frogs uncommonly large. The one whose heart was cut out was rather smaller than the other. They were equally vigorous. Sixty four drops of the solution were injected into the intestines of each of them ; which in this case also were ruptured in both frogs. None of the solution, however, was returned by the opening made for extracting the heart.

In six minutes the fore-limbs of the entire frog were paralytic, and no motion could be excited by irritating its eyes ; the hinder limbs were affected with very violent trembling, and at times with strong spasms, resembling those induced by opium. I have observed this in a less degree in other instances, when tobacco was thrown into the intestines of the entire frog. The muscles of the hinder limbs of this frog were found, after death, almost quite void of irritability.

As for the other, it retained all its motions for fifty-three minutes after the solution was injected ; those of the fore-limbs as perfectly as those of the hinder ones : its eyes moved, when irritated, nineteen minutes longer ; and its muscles contracted after death with unusual force.

All the frogs used in this experiment became languid soon after the injection of the solution. In eight or ten minutes, however, they were considerably less so ; precisely as happened in a similar experiment made with opium.

Whether the heart be previously removed or not, slight convulsive twitchings (chiefly on the back) are sometimes observed immediately after injecting a strong solution of tobacco into the stomach and intestines, or cavity of the abdomen, of a frog, resembling those which often take place in the human body, from a violent local irritation. They are only to be perceived for a minute or two after the injection of the solution.

From the foregoing experiment with tobacco, then, it appears, that the symptoms which it produces, when thrown into the heart, are the same with those excited by its immediate application to the brain : that these symptoms, when the tobacco is exhibited in the former way, proceed from no action of the tobacco on the nerves of the heart, but from its being conveyed through the aorta, and immediately applied to the brain ; since they do not follow

its injection into the heart, when the aorta is previously secured by ligature, although it was found, that interrupting the circulation does not unfit the nervous system from undergoing the change necessary for the production of such symptoms. It also appears from these experiments, that tobacco produced the same effects, though more slowly. when thrown into the stomach and intestines, as when thrown into the heart ; that in the former case, as in the latter, they are still to be ascribed to the tobacco being received into the sanguiferous system, and immediately applied to the brain ; and that the effects of this drug, when it acts merely on the nerves of the part to which it is applied, do not essentially differ from those of any strong local irritation. It may also be collected from these experiments, that the presence of tobacco in the system, like that of opium, only affects the irritability of the muscles of voluntary motion, when it produces convulsions in them ; *i. e.* when it is applied in considerable quantity to the brain. It appears, therefore, that the *modus operandi* of tobacco on the living animal body is analogous to that of opium.

May not poisons, in general, be divided into two classes : The first comprehending those which, applied to the sentient extremities of the nerves, produce effects on the system in general, not essentially different from the effects of mechanical irritation ; but which seem incapable of any other action through the medium of the nerves, although applied to them after laceration ; their effects on the system, when infused into a wound, differing only in degree from those produced by injecting them into any of the cavities of the body ; such are opium, tobacco, and a great variety of other poisonous drugs : The second class comprehending the poisons which seem less apt to affect the sentient extremities of the nerves in the sound state, but, applied to lacerated nerves, produce through them effects essentially different from those of mere local irritation ; such are the poison of the viper, that of rabid animals, and some others ?

Observations on the Doctrine of the Sympathy of Nerves.

THE doctrine of the sympathy of nerves has been so much employed in accounting for the effects of opium, that a few observations upon it here may not be improper. Although there is scarcely any doctrine in medicine more implicitly received, it seems far from being fully established.*

The phenomena which have been referred to the sympathy of nerves, are those in which an involuntary motion, or a sensation, is produced in any part of the body by an irritation applied to the extremities† of the nerves, not of that part, but of some other; such as the motion of the diaphragm in sneezing produced by an irritation of the nares, a pain felt in the glans penis from an affection of the bladder,‡ &c.

These phenomena, then, may be divided into two classes; those in which *sensation*, and those in which *motion*, is the result. I shall, in the first place, consider the former, because under it the more numerous set of facts is included; and because, what I shall say of this class will be found useful when I speak of the other.

The following question is the first that presents itself, concerning which there can scarcely be two opinions. In what part of

* The following opinions concerning this doctrine were laid before the Royal Medical Society of Edinburgh, and ordered to be inserted in their books, on the 1st of February 1794. I mention this circumstance, because a work has appeared since the above date, in which, although the author maintains very different opinions on this head, there are one or two hints thrown out, to which, it might be thought, I should own some obligation.

† A sensation produced in any part, by stretching or compressing the trunk of the nerve which terminates in it, is no instance of the sympathy of nerves. If a nerve going to any part be compressed, the feeling of that part must be impaired. If a nerve be stretched, there must be a pain referred to its extremities, for the same reason that, were we to pull a muscle, we should excite a pain at its insertions. Is it a just inference from these facts, that an injury applied to the nerves of a stump will excite a pain referred to the extremity of the member that is lost? Has not confounding these facts with others referred to the sympathy of nerves, to which they bear no analogy, tended to perplex this subject?

‡ With regard to those cases of sympathy in which the muscles of involuntary motion only are concerned, they do not fall to be considered here; since, in the present state of our knowledge, there is not a shadow of reason for attributing them to any connexion of nerves.

the system does that change take place, which is the immediate cause of sensation?

The immediate cause of sensations, either exists in the various parts to which they are referred, demonstrating that the sensorium commune pervades the whole system; or it does not, demonstrating that the sensorium commune is confined to a particular part of the system, to which every impression causing sensation is conveyed. Since one of these positions must be just, in order to establish either, it is sufficient to show, that the other is false. The question, then, resolves itself into this, Does the immediate cause of sensations exist in the parts to which they are referred?

When a man complains of a pain in the toes, after the limb has been amputated, is the immediate cause of the sensation in the part to which it is referred, or elsewhere? No body can hesitate in answering this question. We have, therefore, an unequivocal instance, in which the immediate cause of sensation does not exist in the part to which it is referred.

But this is not a solitary fact, it is a general law of the animal œconomy, that we continue to refer various sensations to any part of the body, which is suddenly lost for some time after it is so. The fact is as evident in the loss of a finger, or in that of a tooth, as in the loss of a limb. Nor can it be shewn, why the immediate cause of sensation should so exist in these cases, and not in all.

From direct experiment, then, the conclusion is unavoidable, that the immediate cause of sensations does not exist in the parts to which they are referred, but in some other; that is, the sensorium does not pervade the whole system, but is confined to a particular part of it; and having advanced thus far, we know, from numberless observations, that this part is lodged somewhere within the cranium in man, and, by analogy, in the animals that resemble man. In some animals it seems partly lodged in the spine. It is this part, then, which is meant by the term sensorium commune, wherever it occurs in the present paper.

The next question which presents itself is, If the immediate cause of sensation exists in the sensorium commune, why do we very constantly refer the sensation to the part of the body on which the impression, causing it, is made?*

When we look at the various objects that surround us, we refer one to the distance of two feet, another to that of three, and so on, for no other reason, but that experience has taught us to connect

* The mode of reasoning employed in considering this question, though different, is similar to, and was suggested by, what Hartley says of the manner in which we refer sensations to particular parts of the body. See his Theory of the Human Mind.

certain sensations with certain distances. When we see two objects which we know to be nearly of the same tangible extension, for instance, two men. and yet observe, that the one occupies but the fourth of that part of the visible plain which is occupied by the other, we judge the former to be at twice the distance of the latter; if the former occupy but the ninth part of that space occupied by the other, we judge him to be at three times the distance; and so on. The degree of faintness, the number of intervening objects, and a few other circumstances, occasionally assist us when we judge of the distance of objects by the eye. But none of these circumstances are essentially connected with distance; it is only experience which has taught us to connect them in our minds.

Precisely the same thing takes place in the other case; there is no particular sensation essentially connected with any particular part of the body; but experience has taught us to connect certain sensations with certain parts:* so that to the sensation arising from every impression, there is something as it were superadded, which we have constantly observed attend all impressions made on the same part; and it is this which teaches us to refer the sensation to that part; in the same manner as there is something, for instance, the degree of faintness, superadded to the appearance of all bodies at the same distance, which teaches us that they are at that distance.

And, as in the latter case, according to a well known law of the animal economy, we attend to the distance of an object, overlooking the means by which we acquire a knowledge of its distance; so, in the former case, we attend to the injured part, overlooking the means by which we determine its position with respect to other parts of the body.

Is it said, that we have a power of referring sensations to particular parts of the body, independent of experience; the following common experiment is sufficient to convince us that we have not.

We refer sensations with little accuracy to parts of the body which we are not much accustomed to see, or otherwise distinguish from each other. If a person blind his eyes, and desire another to touch one of his small toes, he will find it quite impossible to tell which of them the person touches, and will not guess right much oftener than he would do, were the other touching one of four things quite unconnected with his body.

We arrive, then, at this conclusion, that the immediate cause of sensations exists in the sensorium commune; and that they

* For the manner in which we at first discover the seat of impressions, see Hartley on the Human Mind, and others.

are referred to the parts, on which the impressions causing them are made, by experience alone.

We have all perceived, that the sensation arising from a pretty strong impression is not confined to the very spot to which the injury is applied, but is felt, at the same time, in surrounding parts.

It is also a fact, that the more sensible any of the surrounding parts is, the more, in general, it partakes of the sensation. Thus, in a person labouring under the stone in the bladder, the whole hypogastric region is pained. But the end of the urethra, glans penis, and testicle, parts endowed with very keen feeling, partake more of the sensation than any other.

By how many injuries applied to distant parts, is the stomach affected, which is perhaps the most sensible part of the system?

Inflamed sores, where there is a morbid degree of sensibility, are excellent examples of the same thing. If any part near such a sore be injured, the pain is felt more acutely in the sore than in the other neighbouring parts.*

But it is likewise a fact, that when any of the parts in the neighbourhood of that on which the impression is made, is a part of very acute feeling, while the injured part itself is one of comparatively dull feeling, the sensation excited in the former is often more intense than that excited in the latter.

We have instances of this in both the cases just stated: the pain excited in the sore is often more acute than that excited in the injured part, in its neighbourhood; and that excited in the urethra, glans penis, and testicle, than the pain felt in the region of the bladder. When this takes place, as we attend to the stronger impression, and neglect the weaker, the former only is felt.

In all such cases, we refer the sensation from a less to a more sensible part; yet it is not at all times wholly confined to the latter; for when we attend particularly to the seat of the impression, we generally feel a sensation there, as well as in the more sensible distant part; but one so faint, that it is overlooked while the stronger sensation is present, except we endeavour to perceive it.

* The pain in affections of the liver being referred to the shoulder, and not to the stomach, the more sensible neighbouring part, seems an exception to the general rule. But it appears from many instances, that those parts are most apt to sympathise, which lie nearly in the same line from the brain. This, it is more than probable, is owing to such parts being supplied with nerves from neighbouring parts of this organ. We meet with idiosyncrasy in this as in other functions of the system.

Upon the whole, then, we find, that the sensation is not always confined to the part on which the impression is made; that it is felt in surrounding parts, with various degrees of intensity, generally proportioned to their degrees of sensibility; and that it is sometimes more acute in the more sensible neighbouring parts, than in that to which the injury is applied.

But it has been shewn, that the immediate cause of every sensation exists, not in the part to which it is referred, but in the sensorium commune; and that the sensation is referred to the former, by experience alone.

When we compare these facts, the conclusion is unavoidable, that the phenomena, which are said to depend on the sympathy of nerves, as far as relates to those instances in which sensation only is concerned, proceed from certain changes induced on the sensorium commune, and depending on the two following circumstances; namely, different parts of the sensorium being endowed with different degrees of sensibility, and a change occasioned in one part being capable of inducing a similar change in some other; the sensations caused by such changes, being each referred to its corresponding part of the body, in the manner above explained.

The application of the principles just laid down, to explain particular cases, in which the phenomena in question take place, is in general so evident, that it requires no illustration. I shall consider the only instance in which it is not so. One I have already had occasion to mention, in which we refer the sensation to a part that is separated from the body; and I shall take an example of this, a person complaining of a pain in the toes, after the leg has been amputated.

Provided certain causes, capable of giving us a sensation, which we have been accustomed to refer to a certain part of the body, still continue to act, the sensation will be referred thither, whether the part itself exists or not, till a new experience overcome the former, and teach us not to refer any sensation to a part that is now lost.

It is evident from what has been said, that after the amputation of a limb, there still may exist in the body, causes capable of giving us sensations which we have been accustomed to refer to this limb; for we have been accustomed to refer to it, not only sensations from impressions made on the limb itself, but those from impressions made on parts in its neighbourhood. The pain excited by the irritation at the end of the stump, therefore, is referred to that part of the limb we have lost, as well as to the part which remains.

But it has been shewn, that of the parts in the neighbourhood of that on which the impression is made, those partake most of

the sensation which are endowed with the keenest feeling. Of all the parts of the inferior extremities, the toes are the most sensible : on this account the injury done to the limb is felt more severely in them than in any other part of it.

No one would be surprised to find a person complaining of a pain in the toes, from a wound in any part of the leg, while it still remains attached to the body ; yet, if the facts which have been stated be just, (and that they are so, cannot, I believe, be questioned) the pain, in both cases, is referred to the toes for precisely the same reason.*

With regard to the cases referred to sympathy of nerves, in which motion is the result, it may be observed, we every hour see the sensorium affected by impressions made on the nerves ; and the consequence motion in various parts of the body, uni-

* Speaking of a certain hypothesis, Dr. Darwin observes, in the 3d section of his *Zoonomia*, " There is another objection, that at first view " would seem less easy to surmount. After the amputation of a foot or a " finger, it has frequently happened, that an injury being offered to the " stump of the amputated limb, whether from cold, too great pressure, or " other accident, the patient has complained of a sensation of pain in the " foot or finger that was cut off. Does not this evince that all our ideas " are excited in the brain, and not in the organs of sense ? This objection " is answered by observing that our ideas of the shape, place, and solid- " ity of our limbs, are acquired by our organs of touch and sight, which " are situated in our fingers and eyes, and not by any sensations in the limb " itself."

But how are sensations from impressions made on the stump associated with any idea of the fingers or toes ? Such sensations have been associated with the idea of that part at which the limb was amputated. Dr. Darwin observes, indeed, in the next paragraph, " In this case the pain " or sensation, which formerly has arisen in the foot or toes, and been propagated along the nerves to the central part of the sensorium, was at " the same time accompanied with a visible idea of the shape and place, " and with a tangible idea of the solidity of the affected limb : now, when " these nerves are afterwards affected by any injury done to the remaining stump with a similar degree or kind of pain, the ideas of the shape, place, or solidity of the lost limb, return by association ; as these ideas " belong to the organs of sight and touch on which they were first " cited."

But after a leg is cut off, the cause of irritation at the end of the stump is not applied to the trunks of those nerves only that terminated in the part of which the patient complains, chiefly the toes, it is applied to the cut ends of all the nerves which went to any part of the amputated limb ; so that, were Dr. Darwin's explanation just, not the idea of the toes only, but that equally of every part of the limb, should be associated with the pain at the end of the stump.

Besides, will it be seriously asserted, that were the organs of sight and touch destroyed, the foregoing sympathy could no longer exist ? Does not every thing we know of the subject render such an opinion improbable ? If the mode of reasoning adopted in the text be just, it is wholly set aside.

versally ascribed to the change produced in this part of the system. But why do we select certain motions, sneezing, vomiting, &c. excited by similar impressions, and allege that they depend on other laws? Because the latter motions are involuntary. They are not wholly so, however; both vomiting and sneezing can often for a certain time be interrupted by the will. Besides, they are frequently interrupted, and vomiting even produced, by a strong affection of the mind. And are there not other motions generally admitted to depend on an affection of the sensorium commune, which have the same right to be referred to the sympathy of nerves? Tickling the sides, or soles of the feet, excites violent and completely involuntary motions. Yawning too, and many other similar motions, might be adduced as instances of the same kind.

But this mode of reasoning being laid aside, if it be granted, that the motions which have been referred to sympathy of nerves are not independent of the sensations which precede them, (and nobody, I believe, will assert that they are) it is a corollary from what was said of the cases of sympathy, in which sensation is the result, that these motions proceed from affections of the sensorium commune.

Dr. Monro, who has paid more attention to this subject than most other authors, was led, by many observations, to this conclusion, "That, in general, the nerves of the body sympathise, not from their connexion in their progress, but from their connexion at their origin." I would only go a step farther, and say, that the nerves always sympathise from their connexion at their origin; which is the same as saying, no such thing as the sympathy of nerves exists, and that all the phenomena, which have been referred to this supposed law, depend on affections of the sensorium commune.

But although we admit, (it may be said) that the immediate cause of all these phenomena exists in the sensorium commune, if it be found that those parts are most apt to sympathise, between which there is the most evident connexion of nerves, the connexion of nerves must be regarded as a mediate cause of the phenomena in question. But how slight, in many instances, is this connexion between parts which sympathise most? And where do we find it so evident as between parts which very rarely sympathise? What part, then, do the nerves act in the production of these phenomena? No other than they act in the production of all phenomena in which they are concerned, that of conveying impressions to the sensorium, or of conveying a somewhat (to use Dr. Monro's expression, in the present state of our knowledge the best perhaps we can use) from the sensorium to the muscles of voluntary motion.

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AN
ESSAY
ON THE
NATURE OF FEVER,
BEING
AN ATTEMPT TO ASCERTAIN
THE PRINCIPLES
OF ITS
TREATMENT.

BY
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ADVERTISEMENT.

AS the term *proximate cause* will frequently occur in the following Essay, it is necessary to define the sense in which I use it ; for it will appear, I think, on the most cursory view, that different writers do not always affix the same meaning to it. Those who say that there can be no rational indications of cure, but such as are founded on a knowledge of the proximate cause of diseases, surely do not make the same application of this term, as those who maintain that an attempt to investigate the proximate cause, is absurd, until we are possessed of organs capable of detecting the minutest motions of the animal system. The former cannot mean that our whole attention should be directed towards acquiring a knowledge, which every one must know it is impossible in the nature of things for us to acquire ; nor is it the intention of the latter to assert that it is impossible for us to acquire such a knowledge of the morbid states of the body, as we possess of many of its functions in health, or that such a knowledge would not be of the most essential importance in the treatment of diseases.

The proximate cause has been defined, that state of the body which when present, causes, when removed, removes, and when changed, changes, the disease. When we have ascertained any cause to which this definition applies, and pointed out the means of removing it, we have done all that is necessary. These, therefore, ought to be our objects in treating of the nature of disease. It signifies not what minute motions of the system produced this cause, or by what minute motions the means which remove it, operate.

The word proximate cause is objectionable ; it by no means expresses the idea which the best writers affix to it, and has led to fanciful theories respecting these minute motions of the system, which are doubtless the more immediate, and therefore, strictly speaking, the proximate cause of all diseases, but which we cannot trace, and which, if we could trace, it is probable we could not regulate.

INTRODUCTION.

FROM the silence of Physicians on the proximate cause of fever, since the appearance of Dr. Cullen's *First Lines*, and Dr. Brown's *Elementa Medicinæ*, they appear to have regarded its investigation as a hopeless labour; and it had, before this period, baffled the attempts of so many, that the following Essay would require some apology, were it not that in the advancing state of science, every new inquirer has better data than those who preceded him.

Besides, certain pre-conceived opinions seem to have influenced all who have written on the nature of fever; and it appears to me, that the difficulty which has attended the inquiry, has proceeded as much from the manner in which it has been conducted, as from the nature of the subject. Many have formed their hypotheses either from a partial view of fever, as in the *First Lines*, or from other phenomena of the animal system, as in the *Elementa Medicinæ*; and the chief aim of the theorist has been to shew in what way his hypothesis may be applied to account for the phenomena of fever.

This mode of reasoning would not be admitted in any other science. It is not only necessary for the theorist to point out the steps by which he has arrived at his conclusion, but to shew that the phenomena admit of no other, and not till then is he entitled to descend from his hypothesis to the phenomena, and to shew in what manner it accounts for those, which were not previously noticed, because they were not necessary to establish it.

Another cause which has retarded the inquiry into the proximate cause of fever, is a frequent reference to the *vis medicatrix naturæ*. Physicians seem to have thought, that to explain the nature of any disease, it is only necessary to shew that it is a salutary effort of the system, forgetting that the nature of the disease must be first understood before it is possible to ascertain whether its tendency is salutary or not.

No writer refers more frequently to the *vis medicatrix naturæ* than Dr. Cullen, yet in the Preface to his *First Lines*, after some

observations on the doctrine of Stahl, he remarks ; “ I might go farther, and shew how much the attention to the *Autocrateia*, allowed of, in one shape or other, by every sect, has corrupted the practice among all Physicians, from Hippocrates to Stahl. It must, however, be sufficiently obvious, and I shall conclude the subject with observing, that although the *vis medicatrix nature* must unavoidably be received as a fact, yet wherever it is admitted, it throws an obscurity upon our system ; and it is only where the impotence of our art is very manifest and considerable, that we ought to admit of it in practice.” I shall have occasion, in the beginning of the Appendix, to make some observations on this subject.

In the first volume of my Treatise on Febrile Diseases, published in 1799, the reader will see the imperfect outline of the present Essay. I there only pointed out, that in fever the laws of excitability differ from those of health, and this change I was contented to regard as the proximate cause of fever, without attempting to ascertain on what it depends.

In the second volume, which appeared in 1800, I comprised in the following lines the result of my observations on this subject.

“ Towards ascertaining the proximate cause of fever I did not attempt to do much. It appears, as far as I can judge from the observations alluded to, that fever is not owing to any change induced on the fluids, their becoming too acrimonious, too viscid, &c. nor to any change in the state of the simple solid, nor to a partial change in that of the living solid, such as relaxation, or spasm of particular parts ; nor to any exhaustion or accumulation of the excitability ; (these, as far as I know, are the only rational opinions which have been maintained on the subject ;) but to the laws of excitability being changed, not in any one, but in every part of the living solid, and equally changed in every part of it, in consequence of which, the natural agents no longer produce moderate excitement, followed by exhaustion, but atony, or that degree of excitement which is followed by atony.”

In arriving at these conclusions, I was led to consider minutely the hypothesis of Dr. Brown, which professed, and by many was believed, to unfold the true nature of fever ; whereas Dr. Cullen’s, as will appear from what I shall have occasion to say of it in the first part of this Essay, was confessedly hypothetical. I endeavoured to point out, that the laws of excitability maintained by Dr. Brown, apply only to those powers on which the animal functions depend ; that there is a state of debility, which I termed atony, wholly different from Dr. Brown’s exhaustion, or accumulated excitability ; and a state of excitement which differs from Dr. Brown’s excitement in not being succeeded by exhaustion, but by atony, which, to distinguish it, I called excessive excitement ; that Dr. Brown’s excitement and exhaustion are always healthy

states, and consequently that he erred in supposing the system in disease regulated by the same laws which it obeys in these states, and therefore failed in applying his doctrine to the cure of diseases; that excessive excitement and atony are the only general diseases properly so called, all other diseases of the system arising from some local disease, and that these states are the same which we term synocha and typhus.

After devoting, in vain, much time to a review of the phenomena of fever, in order to acquire a more explicit knowledge of its proximate cause, I republished my observations on this subject in 1803, in the same words, with very few exceptions, in which they first appeared. It seems to me, that since that time, my endeavours have been more successful, and that the cause of the change in the laws of excitability, which we observe in fever, may be distinctly traced, and its phenomena explained, in as simple and satisfactory a way as those of any other disease.

I shall divide the following Essay into two parts. In the first, I shall consider the chief opinions which have prevailed respecting the proximate cause of fever, and point out what appears to me to be their defects. In the other, I shall lay before the reader the steps by which I arrived at my opinion on this subject, and the manner in which it explains the various phenomena of fever.

AN ESSAY, &c.



CHAP. I.

Of the Opinions which have prevailed respecting the proximate Cause of Fever.

IT required but a very imperfect knowledge of the animal œconomy to suggest, that some of the phenomena of fever may be explained by supposing the blood to have acquired morbid properties; and, till the time of Stahl, Hoffman and Boerhaave, Physicians endeavoured in vain to show that the blood is so changed in fevers as to account for all their phenomena, on the supposition of the solids remaining in the same state as in health. To give an account of the more ancient opinions respecting the proximate cause of fever, or even of those which prevailed at the time just mentioned, when all Physicians were either followers of Galen, or had adopted the bolder, but equally unfounded hypothesis of Paracelsus, would be a tedious and uninteresting task. The error of the principles on which these hypotheses rest, will sufficiently appear from what it will be necessary to say of the opinions of later writers.

About the time I am speaking of, the discovery of the circulation of the blood, the most important step ever made towards a knowledge of the animal œconomy, and the true principles of reasoning, unfolded in the works of Lord Bacon, began gradually to open the eyes of Physicians to the errors of their systems. When they found that the fluids perform but a subordinate part in the animal œconomy, and were taught to distinguish between the workings of fancy, and the inductions of reason, they began to feel less reverence for the system of Galen, and the opinions of Paracelsus. But these causes operated slowly; and, although Physicians were enabled to detect the errors of their predecessors, they were not prevented from falling into similar errors themselves, or even from, in part, adopting the errors they exposed.

It is true that Stahl, without hesitation or reserve, rejected both the hypotheses and mode of reasoning adopted by those who went before him ; but to compensate for the service he thus rendered to medicine, his own hypothesis more eminently sets at defiance all just rules of reasoning than that of any of his predecessors.* He, however, must be regarded as the first who diverted the attention of Physicians from what Dr. Cullen calls the humoral pathology.

Hoffman and Boerhaave retained many of the most exceptionable parts of this pathology ; but their writings occasioned a change in medical reasonings, of far greater consequence than any that could be effected by the chimerical hypothesis of Stahl. They pointed out the solids as that part of the animal system to which we are chiefly to look for the causes of the various changes we observe in it.

The systems of these writers prevailed till the days of Cullen and Brown, who admiring the effects of this change in medical reasoning, have, if I may be allowed to give my opinion, carried it much too far, by endeavouring to account for all the symptoms of diseases by the changes induced on the solids alone.

I shall make a few observations on the theories of Hoffman and Boerhaave, and then consider more at length those of Cullen and Brown.

SECT. I.

Of the Hypotheses of Hoffman and Boerhaave.

WHILE Hoffman admitted many parts of the hypotheses of his predecessors, he saw the necessity of a principle essentially different from any hitherto assumed. As this principle is the only original, and indeed the only valuable part of his hypothesis, we shall confine our attention to it, and we cannot have a better account of it than in the author's words, which I shall quote :
 “ Ex hisce autem omnibus uberius hactenus excussis, perquam
 “ dilucide apparere arbitror, quod solus spasmus et simplex atonia, æquabilem, liberum, ac proportionatum sanguinis, omnisque generis fluidorum motum, quibus excretionum successus et integritas functionum animi et corporis proxime nititur, turbando ac pervertendo, universam vitalem œconomiam subruant ac destruant ; atque hinc universa pathologia longe rectius atque facilius ex vitio motuum microcosmicorum in solidis, quam ex variis affectionibus vitiosorum humorum, deduci atque explicari possit ; adcoque omnis generis ægritudines internæ ad

* Appendix, Note 1.

" preternaturales generis nervosi affectiones sint referendæ.
 " Etenim læsis quocunque modo, vel nervis per corpus discurs-
 " rentibus, vel membranosis quibusvis nervosis partibus, illico
 " motuum anomaliam, modo leviores modo graviores subsequuntur.
 " Deinde attenta observatio docet, motus quosvis morbosos sedem
 " figere et tyrannidem exercere in nervosis corporis partibus, cujus
 " generis, (præter omnes canales, qui systaltico et diastaltico motu
 " pollentes, contentos succos tradunt, universum nimirum intesti-
 " norum et ventriculi ab œsophago ad anum canalem, totum sys-
 " tema vasorum arteriosorum, ductuum biliariorum, salivalium,
 " urinariorum et subcutaneorum, sunt quoque membranæ nerveo-
 " musculares cerebri et medullæ spinalis, præsertim hæc quæ
 " dura mater vocatur, organis sensoriis obductæ, nec non tunicæ
 " illæ ac ligamenta quæ ossa cingunt artusque firmant. Nam
 " nullus dolor, nulla inflammatio, nullus spasmus, nulla motus et
 " sensus impotentia, nulla febris aut humoris illius excretio acci-
 " dit, in qua non hæc partes patiuntur.

" Porro etiam omnes quæ morbos gignunt causæ, operationem
 " suam potissimum perficiunt in partes motu et sensu præditas,
 " et canales ex his coagmentatos, eorum motum, et cum hoc, flu-
 " idorum cursum, pervertendo ; ita tamen, ut sicuti variæ indolis
 " sunt, sic etiam variè in nervosas partes agunt, iisdemque noxam
 " afferunt. Demum omnia quoque exiniæ virtutis medicamen-
 " ta non tam in partes fluidas, earum crasin ac intemperiem
 " corrigendo, quam potius in solidas et nervosas, earundem mo-
 " tus alterando ac moderando suam edunt operationem : de qui-
 " bus tamen omnibus, in vulgari usque co recepta morborum doc-
 " trina, altum est silentium.*

On the foregoing passage Dr. Cullen observes, " There can
 " be no sort of doubt that the phenomena of the animal œco-
 " nomy in health and in sickness, can only be explained by consi-
 " dering the state and affections of the primary moving powers
 " in it. It is to me surprising that Physicians were so long in
 " perceiving this, and I think we are therefore particularly in-
 " debted to Dr. Hoffman for putting us into the proper train of in-
 " vestigation ; and it every day appears that Physicians perceive
 " the necessity of entering more and more into this inquiry. It was
 " this, I think, which engaged Dr. Kaaw Boerhaave to publish his
 " work entitled *Impetus faciens* ; as well as Gaubius to give the
 " Pathology of the *Solidum vivum*. Even the Baron Van Swie-
 " ten has upon the same view thought it necessary, in at least one
 " particular, to make a very considerable change in the doctrine
 " of his master, as he has done in his commentary upon the
 " 755th Aphorism. Dr. Haller has advanced this part of science
 " very much by his experiments on irritability and sensibility.—
 " In these and in many other instances, particularly in the wri-

* See Dr. Hoffman's Med. Rat. Syst. Tom. III. § 1. Chap. 4.

“tings of Mr. Barthez, of Montpellier, of some progress in the study of the affections of the nervous system, we must perceive how much we are indebted to Dr. Hoffman for his so properly beginning it.”

The principal circumstance in which the system of Boerhaave differs from that of Hoffman, is in the former's resting rather on the state of the simple than of the living solid ; for Boerhaave believed that most of the changes of the animal system, which do not depend on the state of the fluids, arise chiefly from the rigidity or laxity of the simple solid.

Of the state of the fluids, being a better Chemist, he spoke more accurately than his predecessors ; but both in this and the other parts of his system his data are in general hypothetical, in some instances evidently erroneous, and his reasonings lead to no conclusions which can now be admitted.

The consistency and simplicity of Boerhaave's system, together with the great knowledge displayed both by himself and his commentator Van Swieten, in support of it, occasioned it to be very generally received, and for many years it wholly superseded the system of Hoffman.

Later Physiologists, however, have pointed out, in a satisfactory manner, that in the changes of the animal system the living, not the simple, solid is chiefly concerned ; and in medical reasoning the state of the latter is now almost neglected. However much the original constitution of an animal body may depend on the state of the simple solid, and however much a change in this solid may affect its state at any period of life, the changes induced on the simple solid must in general themselves depend on the state of the moving powers. Besides, no writer has pointed out to us of what nature these changes are, or in what manner they affect the system ; while, on the other hand, we readily observe many changes which take place in the living solid, and the consequences which attend them.

These circumstances at length led Physicians to reject the system of Boerhaave, and to aim at such a modification of that of Hoffman, as should adapt it to the improved state of physiological knowledge. This has been attempted by three writers of great name, Dr. Cullen, Dr. Brown, and Dr. Darwin. The opinions of the two latter are so similar, that it will be unnecessary to examine both, and as Dr. Brown's work was first given to the world, although it would appear that Dr. Darwin's was written about the same time, I shall confine my observations to the former.

SECT. II.

Of the Hypothesis of Dr. Cullen.

IN the present section, I mean in the first place to give a view of Dr. Cullen's hypothesis, which cannot be better done than in his own words, and then to enquire how far it explains the nature of fever.

"The proximate cause of fever," he observes, "seems hitherto to have eluded the research of Physicians; and I shall not pretend to ascertain it in a manner that may remove every difficulty; but I shall endeavour to make an approach towards it, and such as I hope may be of use in conducting the practice in this disease; while at the same time I hope to avoid several errors which have formerly prevailed on this subject.

"As the hot stage of fever is so constantly preceded by a cold stage, we presume that the latter is the cause of the former; and, therefore, that the cause of the cold stage is the cause of all that follows in the course of the paroxysm. See Boerh. apph. 756.

"To discover the cause of the cold stage of fevers, we may observe, that it is always preceded by strong marks of a general debility prevailing in the system. The smallness and weakness of the pulse, the paleness and coldness of the extreme parts, with the shrinking of the whole body, sufficiently shew that the action of the heart and larger arteries is for the time extremely weakened. Together with this, the languor, inactivity and debility of the animal motions, the imperfect sensations, the feeling of cold while the body is truly warm, and some other symptoms, all show that the energy of the brain is on this occasion greatly weakened; and I presume, that as the weakness of the action of the heart can hardly be imputed to any other cause, this weakness also is a proof of the diminished energy of the brain.

"I shall hereafter endeavour to shew, that the most noted of the remote causes of fever, as contagion, miasmata, cold and fear, are of a sedative nature, and therefore render it probable that a debility is induced. Likewise, when the paroxysms of a fever have ceased to be repeated, they may again be renewed, and are most commonly renewed, by the application of debilitating powers; and further, the debility which subsists in the animal motions, and other functions, through the whole of the fever renders it pretty certain that sedative, or debilitating powers have been applied to the body.

“ It is therefore evident, that there are three states which always takes place in fever—a state of debility, a state of cold, and a state of heat ; and as these three states regularly and constantly succeed each other, in the order we have mentioned them, *it is presumed that they are in the series of cause and effect with respect to one another.* This we hold as a matter of fact, even although we should not be able to explain in what manner, or by what mechanical means these states severally produce each other.

“ How the state of debility produces some of the symptoms of the cold stage, may perhaps be readily explained ; *but how it produces all of them, I cannot explain otherwise than by referring the matter to a general law of the animal economy, whereby it happens, that powers which have a tendency to hurt and destroy the system, often excite such motions as are suited to obviate the effects of the noxious power. This is the vis medicatrix naturæ, so famous in the schools of physic ; and it seems probable, that many of the motions excited in fever are the effects of this power.*

“ *That the increased action of the heart and arteries, which takes place in the hot stage of fevers is to be considered as an effort of the vis medicatrix naturæ, has been long a common opinion among Physicians, and I am disposed to assert, that some part of the cold stage may be imputed to the same power.* I judge so because the cold stage appears to be universally a means of producing the hot : because cold externally applied has very often similar effects ; and more certainly still, because it seems to be in proportion to the degree of tremor in the cold stage, that the hot stage proceeds more or less quickly to a termination of the paroxysm, and to a more complete solution and longer intermission.

“ It is to be particularly observed, that during the cold stage of fever there seems to be a spasm induced every where on the extremities of the arteries, and more especially of those on the surface of the body. This appears from the suppression of all excretions, and from the shrinking of the extreme parts : and although this may perhaps be imputed, in part, to the weaker action of the heart, in propelling the blood into the extreme vessels, yet as these symptoms often continue after the action of the heart is restored, *there is reason to believe that a spastic constriction has taken place that it subsists for some time, and supports the hot stage ; for this stage ceases with the flowing of the sweat, and the return of excretions, which are marks of the relaxation of vessels formerly constricted*—Hoffman. Med. Rat. Syst. Tom. 4th P. I. § 1. Chap. 1. Art. 4.

“ The idea of fever then *may be*, that a spasm of the extreme vessels, however induced, proves an irritation to the heart and

“ arteries, and that this continues till the spasm is relaxed or over-
 “ come. There are many appearances which support this opin-
 “ ion, and there is little doubt that a spasm does take place,
 “ which proves an irritation to the heart, and therefore may be
 “ considered as a principal part in the proximate cause of fever.
 “ *It will still, however, remain a question, what is the cause of this*
 “ *spasm, whether it be directly produced by the remote causes of*
 “ *fever, or if it be only a part of the operation of the vis medica-*
 “ *trix naturæ?*

“ *I am disposed to be of the latter opinion, because, in the first*
 “ place, while it remains still certain that a debility lays the foun-
 “ dation of fever, it is not obvious in what manner the debility
 “ produces the spasm, and what seems to be its effect, the in-
 “ creased action of the heart and arteries : and secondly, because,
 “ in almost all the cases in which an effort is made by the vis
 “ medicatrix naturæ, a cold fit and a spasm of the remote vessels
 “ are almost always the beginning of such an effort. See Gaub.
 “ Pathol. Medicin. Art. 750.

“ *It is therefore presumed, that such a cold fit and spasm at the*
 “ beginning of fever, is a part of the operation of the vis medica-
 “ trix ; but, at the same time, *it seems to me probable, that during*
 “ the whole course of the fever, there is an atony subsisting in
 “ the extreme vessels, and that the relaxation of the spasm re-
 “ quires the restoring of the tone and action of these.

“ *This it may be difficult to explain ; but I think it may be ascer-*
 “ tained as a fact, by the consideration of the symptoms which
 “ take place with respect to the functions of the stomach in fe-
 “ vers, such as the anorexia, nausea, and vomiting. From many
 “ circumstances it is sufficiently certain, that there is a consent
 “ between the stomach and surface of the body ; and, in all cases
 “ of the consent of distant parts, it is presumed to be by the con-
 “ nection of the nervous system, and that the consent, which ap-
 “ pears is between the sentient and moving fibres of the one part
 “ with those of the other ; is such, that a certain condition pre-
 “ vailing in the one part occasions a similar condition in the other.
 “ In the case of the stomach and surface of the body, the consent
 “ particularly appears by the connection which is observed be-
 “ tween the state of the perspiration and the state of the appetite
 “ in healthy persons ; and if it may be presumed that the appe-
 “ tite depends upon the state of tone in the muscular fibres of the
 “ stomach, it will follow that the connection of appetite and
 “ perspiration depends upon a consent between the muscular
 “ fibres of the stomach, and the muscular fibres of the ex-
 “ treme vessels, or of the organ of perspiration, on the surface
 “ of the body. It is further in proof of the connection be-
 “ tween the appetite and perspiration, and at the same time of the
 “ circumstances on which it depends, that cold applied to the sur-

" face of the body, when it does not stop perspiration. but proves
 " a stimulus to it. is always a powerful means of exciting appetite.
 " Having thus established the connection or consent mentioned,
 " we argue. that as the symptoms of anorexia, nausea, and vomit-
 " ing in many cases manifestly depend upon a state of debility or
 " loss of tone in the muscular fibres of the stomach, *so it may be*
 " *presumed*. that these symptoms in the beginning of fever depend
 " upon an atony communicated to the muscular fibres of the sto-
 " mach from the muscular fibres of the extreme vessels on the
 " surface of the body. That the debility of the stomach which
 " produces vomiting in the beginning of fever. actually depends
 " upon an atony of the extreme vessels on the surface of the body,
 " appears particularly from a fact observed by Dr. Sydenham.
 " In the attack of the plague, a vomiting happens, which prevents
 " any medicine from remaining on the stomach; and Dr. Syden-
 " ham tells us that in such cases he could not overcome this vomit-
 " ing but by external means applied to produce a sweat. that is, to
 " excite the action of the vessels on the surface of the body. The
 " same connection between the state of the stomach and that of
 " the extreme vessels on the surface of the body, appears from
 " this also: that the vomiting which so frequently happens in the
 " cold stage of fevers commonly ceases upon the coming on of the
 " hot, and very certainly upon any sweats coming out. It is in-
 " deed probable that the vomiting, in the cold stage of fevers, is
 " one of the means employed by nature for restoring the deter-
 " mination to the surface of the body; and it is a circumstance
 " affording proof both of this and of the general connection be-
 " tween the stomach and the surface of the body, that emetics
 " thrown into the stomach, and operating there in the time of the
 " cold stage, commonly put an end to it and bring on the hot stage.
 " It also affords a proof of the same connection. that cold water
 " taken into the stomach produces an increase of heat on the sur-
 " face of the body, and is very often a convenient and effectual
 " means of producing sweat. From the whole we have now said
 " on this subject, *I think it is sufficiently probable* that the symp-
 " toms of anorexia, nausea, and vomiting depend upon, and are a
 " proof of an atony subsisting in the extreme vessels on the sur-
 " face of the body, and that this atony, therefore. now ascertained
 " as a matter of fact, may be considered as a principal circum-
 " stance in the proximate cause of fever.

" This atony we suppose to depend upon a diminution of the
 " energy of the brain; and that this diminution takes place in fe-
 " vers we conclude not only from the debility prevailing in so ma-
 " ny of the functions of the body mentioned above, but particu-
 " larly from symptoms which are peculiar to the brain itself.
 " Delirium is a frequent symptom of fever; and as from the phy-
 " siology and pathology we learn that this symptom commonly
 " depends upon some inequality in the excitement of the brain,
 " or intellectual organ, we hence conclude that in fever it denotes
 " some diminution in the energy of the brain. Delirium, indeed,

“ seems often to depend upon an increased impetus of the blood
 “ in the vessels of the brain, and therefore attends phrenitis. It
 “ frequently appears also, in the hot stage of fevers, accompanied
 “ with a head ach and throbbing of the temples. But as the im-
 “ petus of the blood in the vessels of the head is often considera-
 “ bly increased by exercise, external heat, passions, and other
 “ causes, without occasioning any delirium; so supposing that
 “ the same impetus in the case of fever produces delirium, the
 “ reason must be that at the same time there is some cause which
 “ diminishes the energy of the brain, and prevents a free commu-
 “ nication between the parts concerned in the intellectual func-
 “ tions. Upon the same principles also. I suppose there is ano-
 “ ther species of delirium depending more entirely on the dimin-
 “ ished energy of the brain, and which may therefore arise when
 “ there is no unusual increase of the impetus of the blood in the
 “ vessels of the brain. Such seems to be the delirium occurring
 “ at the beginning of the cold stage of fevers, or in the hot stage
 “ of such fevers as shew strong marks of debility in the whole
 “ system.

“ Upon the whole, our doctrine of fever is explicitly this: The
 “ remote causes are certain sedative powers applied to the ner-
 “ vous system, which diminishing the energy of the brain. there-
 “ by produce a debility in the whole of the functions, and particu-
 “ larly in the action of the extreme vessels. Such however, is,
 “ at the same time, the nature of the animal œconomy, that this
 “ debility proves an indirect stimulus to the sanguiferous system,
 “ whence, by the intervention of the cold stage and spasm con-
 “ nected with it, the action of the heart and larger arteries is in-
 “ creased, and continues so till it has had the effect of restoring
 “ the energy of the brain, of extending this energy to the extreme
 “ vessels, of restoring therefore their action, and thereby espe-
 “ cially overcoming the spasm affecting them; upon the remo-
 “ ving of which, the excretion of sweat and other marks of the
 “ relaxation of excretories take place.”

From the parts of the preceding quotation which are printed in Italic letters, it is evident that Dr. Cullen regarded his doctrine of fever as little more than an hypothesis, calculated to give arrangement to detached facts, which without some system, readily slip from the memory.

He believed, indeed, and it must be admitted, that it was founded on a better principle than that of any of his predecessors, except Hoffman; and he perceived that it was more simple and consistent than the doctrines of this writer; but he looked forward to a more advanced state of science, in which his system would suffer a change similar to that which he had effected in Hoffman's. All this he expresses fully in the Preface to his *First Lines*.

"Upon this general plan," he observes, "I have endeavoured to form a system of physic that should comprehend the whole of the facts relating to the science, and that will, I hope, collect and arrange them in better order than has been done before as well as point out, in particular, those which are still wanting to establish general principles. This which I have attempted may, like other systems, hereafter suffer a change; but I am confident that we are at present in a better train of investigation than physicians were in before the time of Dr. Hoffman."

But setting aside what Dr. Cullen says of his doctrine, if we examine the doctrine itself we shall find that it is wholly constructed on a hypothetical basis, on the supposed operations of the *vis medicatrix naturæ*, respecting which we have in the Introduction to this Essay given Dr. Cullen's opinion.

How the debility of the nervous, proves an indirect stimulus to the sanguiferous system; how this stimulus acts in exciting the cold stage and spasm; how, through the intervention of these, the action of the heart and larger arteries is increased; is only explained by reference to the operation of the *vis medicatrix*, that is, is not explained at all; and yet it appears even at first view that on these the whole system rests.

Shall we suppose Dr. Cullen, after declaring "that wherever the *vis medicatrix* is admitted into medical systems it throws an obscurity on them," so inconsistent as to offer as a true system one wholly and avowedly founded on the supposed operations of this agent!

On entering on a more particular consideration of Dr. Cullen's hypothesis, we meet with other fundamental objections to it.—From the nervous debility which attends the commencement of fever, he infers, that the first morbid change induced is a diminished energy of the brain. But this debility is never observed at the commencement of fever, without a corresponding debility of the circulating system. It was incumbent on Dr. Cullen, therefore to enquire which was the primary affection. We know that every change in the state of the circulating, is immediately felt in the nervous system. But on the other hand, that the latter is often most essentially deranged (as I shall soon have occasion to point out more particularly) without materially, or even at all, deranging the functions of the former. The probability therefore is, that the causes of fever, which uniformly affect both systems, make their first impression on the sanguiferous system. Dr. Cullen adduces no arguments to counterbalance this probability.

We have every reason to believe that a spasm of the extreme vessels is not essential to fever, as Dr. Cullen supposes it to be.

That atony of these vessels is essential to fever we can hardly doubt, because we see no instance of fever without evident marks of it : but whether the extreme vessels fall into a state of constriction, or relaxation, in consequence of this atony, the nature of the symptoms which ensue, is the same. In some fevers the secreting surfaces are relaxed from the commencement.* These have been found the most fatal, which will not surprise us when we reflect that the debility which gives rise to spasm is much less than that which occasions relaxation, in which the parts may be said wholly to have lost their tone. Hence constriction of the extreme vessels is most common in the early, and relaxation in the latter stages of fever ; and hence, also it is, that although a sweat, induced by a return of vigor to the extreme vessels, is the most favourable of all the symptoms of fever, that kind of sweat which arises from mere relaxation of these vessels, is often among the most fatal.†

As Dr. Cullen considers a weakened energy of the brain as the cause of all the symptoms of fever, he believes that a restoration of the due energy of this organ is the only means of removing them. This he supposes to be effected by the increased action of the heart and larger arteries. But as we never observe the energy of the brain restored, without a corresponding change taking place in the extreme vessels ; here again it was necessary for Dr. Cullen to enquire which was the primary change ; and in this instance, also, the general laws of the animal œconomy oppose his opinion. Is it more consonant with these laws to suppose that the increased action of the heart and larger arteries restores energy to the brain, and that this energy gives tone to the extreme vessels ; or that the increased action of the heart and larger arteries is the means of exciting the extreme vessels, and that the tone of the brain is restored in the same way with that of the skin, kidneys, &c. by the renewed vigor of the circulation ? Is it possible that there should be a renewal of the energy of the brain until the functions of the extreme vessels are restored ?

Dr. Cullen supposes that the removal of the spasm of the extreme vessels, and the consequent relaxation of the excretories necessarily remove the fever. But we find from observation that these may take place while the fever increases, while the pulse becomes more frequent and feeble, the breathing more oppressed, and the various other functions, both natural and animal, more deranged.

Dr. Cullen's hypothesis then appears to be doubly objectionable, as resting on the supposed operations of the *vis medicatrix naturæ*, and being inconsistent with observation and the known laws of the animal œconomy.

* Appendix. Note 2.

† Appendix, Note 3.

As an hypothesis to serve the temporary use of connecting together a long catalogue of facts, till we should arrive at a more explicit knowledge of the nature of fever, it is elegant and ingenious ; and admitting the data, accounts for all the phenomena of this disease : but Dr. Cullen is every where ready to confess the insufficiency of these data.

Dr. Brown, on the other hand, with data no less, though not so apparently ill-founded, has endeavoured to conceal the defects of his hypothesis, and give it the appearance of what he wished it to be thought, a true system of medicine ; and it is so blended with certain positions, of the accuracy of which there can be no doubt, and which were universally admitted long before Dr. Brown wrote, that, to detect its errors, it will be necessary to examine it in detail.

SECT. III.

Of the Hypothesis of Dr. Brown, and the Laws of Excitability.

WE cannot state Dr. Brown's hypothesis* in the way in which Dr. Cullen's is stated in the preceding Section, for he never chose to give any connected view of it, but left the reader to collect it from various passages of his *Elementa Medicinæ* ; and such are the contradictions that prevail in this work, that in extracting from it a consistent doctrine, it will be necessary, we shall find, to reject many passages which cannot be reconciled to the opinions in general maintained in it.

I shall give a concise view of this doctrine, and then point out what appears to me to be its defects, at the same time considering such topics as it is necessary to discuss before we enter on the subject of the next Chapter ; so that the present Section may be regarded as an introduction to that Chapter, as well as a view and examination of the Brunonian hypothesis. To this arrangement there appears to be no objection ; and, from the intimate connection of the subjects, it will save repetition.

That power by which the phenomena peculiar to the living state are produced, is termed by Dr. Brown, excitability ; under this term he includes both the nervous and muscular power,† and seems in some places to include a power different from either.‡

He considers every agent, capable of producing any change in the living body, an exciting power,|| and consequently terms all agents stimuli,§ and their effect on the living solid he terms excitement.**

* Appendix, Note 4.

‡ Appendix, Note 6.

§ Note 8.

† Appendix, Note 5.

|| Note 7.

** Note 9.

In proportion as they produce excitement, they exhaust the excitability; that is, render the living body less capable of being excited.*

As Dr. Brown does not admit that there is any agent capable of producing a sedative effect, he maintains that excitement can only be diminished by an excess or abstraction of stimuli.†

The excitability, according to his hypothesis, has no existence except when acted upon by stimuli.‡ By the total abstraction of stimuli, it is as effectually destroyed as by their excessive application; it is on this account that Dr. Brown terms life a forced state.

He does not consider the excitability as a property residing in, and depending on the mechanism of, particular parts; but an uniform, indivisible property, pervading the whole system, which cannot be affected in any one, without being affected in a similar way in every other part.||

Upon the whole, according to the Brunonian system, the excitability (the power on which the phenomena of life depend) is an uniform, indivisible property residing in every living body, whether animal or vegetable, to whose existence the constant application of stimuli is necessary, which excitement tends constantly to exhaust, which may be destroyed by the excessive application of stimuli, and which accumulates in consequence of their partial abstraction.§

With respect to the powers to which we are to attribute the accumulation of excitability Dr. Brown leaves us in the dark.—The powers in question, it may be said, are those of digestion and assimilation. But how is this to be reconciled with the favorite hypothesis of Dr. Brown, that a certain quantity of excitability, to last through life, is bestowed on every living body at the commencement of its existence?***

Between the healthy state, in which the excitability and stimuli applied are in due proportion, and death, in which the excitability is extinguished, either by excess, or too great an abstraction of stimuli, the Brunonian system supposes all possible gradations. These are evidently to be divided into two classes, those in which the excitability is to a certain degree exhausted by too great an application of stimuli, and those in which a morbid accumulation is supposed to take place in consequence of too great an abstraction of stimuli. In the latter of these, the body is said to be in a state of direct,†† and in the former, of indirect,‡‡ debility. These are supposed to be its morbid states.

* Appendix, Note 11.

‡ Note 13.

§ Note 15.

†† Note 17.

† Note 12.

‡‡ Note 14.

*** Note, 16.

It is evident, however, that there is a state of body different from either of these, and different also from the healthy state. When stimuli are too much abstracted, debility is supposed immediately to ensue; but the immediate consequence of too great an application of stimuli is not debility, but increased excitement. Dr. Brown, therefore, although he maintains that in the greater number of diseases, the system is in a state of debility,* yet admits that there are many in which it is in a state of increased excitement.†

The diseases of excitement he terms sthenic, those of debility asthenic. These two classes include all general diseases.

The foregoing principles Dr. Brown regarded as fully demonstrated, and with a want of caution, altogether inexcusable, founded on them his modes of practice.

As he allows excess of excitement to be a morbid condition of the body, he admits that an abstraction of stimuli is in some cases requisite;‡ but he chiefly depends for the cure of diseases on the addition of stimuli. On this, his plan of treatment in the diseases both of direct and indirect debility is founded. In the former, we are taught that the morbid accumulation of excitability is to be reduced by a cautious application of more stimuli;§ in the other, in which the excitability has been morbidly diminished by too great an application of stimuli, that the cure is to be begun by a stimulus, but a little weaker than that which produced the disease, and the system brought to the healthy state, by gradually diminishing the quantity of stimulus employed; time being thus given for the excitability to be sufficiently restored for the functions of the system to go on, in consequence of the application of the natural stimuli alone.||

Such is the system of Dr. Brown, or rather that which may be collected from his *Elementa Medicinæ*, for, in order to give the reader a distinct view of it, I have been obliged to separate the system always aimed at, and often clearly expressed in the writings of Dr. Brown, from many of his opinions which have introduced much confusion into this system, and often directly contradict its fundamental principles.

Although the opinions here alluded to, are not to be regarded as any part of the Brunonian hypothesis, since they are incompatible with it, as they have generally been thought to make part of this hypothesis, it is necessary to say something of them that my account of it may not appear defective.

* Appendix, Note 13.

† Note 19.

‡ Note 20.

§ Note 21.

|| Note 22.

One of the most striking inconsistencies in the writings of Dr. Brown, I have just had occasion to allude to—that every living body at the commencement of its existence receives a certain quantity of excitability, which, if not extinguished by violent stimuli, or by too great an abstraction of stimuli, will last for a certain length of time. The quantity received, he supposes, determines the natural duration of life, it being impossible to protract it after that quantity is exhausted.

“ We know not (he observes) what excitability is, or in what manner it is affected by the exciting powers. But whatever it be, whether a quality or a substance, a certain portion is assigned to every being upon the commencement of its living state. The quantity or energy is different in different animals, and in the same animal at different times. It is partly owing to the uncertain nature of the subject, partly to the poverty of language, and partly to the novelty of this doctrine, that the phrases of the excitability, being abundant, increased, accumulated, superfluous, weak, not well enough sustained, not well enough exercised, or deficient in energy, when enough of stimulus has not been employed; tired, fatigued, worn out, languid, exhausted, or consumed, when the stimulus has operated in a violent degree; at other times in vigour, or reduced to one half, when the stimulus has neither been applied in excess or defect; will be employed in different parts of this work.”

It is almost unnecessary to observe, that the different parts of the foregoing quotation are perfectly irreconcilable. The confusion which Dr. Brown here attributes to the poverty of language, and the novelty of the subject, arises from the most evident contradictions in his hypothesis. Dr. Beddoes justly observes, that “ he who assumes that a certain portion of excitability is originally assigned to every living system, by his very assumption denies its continual production, subsequent diffusion and expenditure, at a rate equal to the supply, or greater or less.”

An inconsistency, if possible; more remarkable than this, is the supposition that both the above species of debility may exist in the same body at the same time. In paragraph ccxl. he observes, “ As debility, therefore, whether direct or indirect, or both conjoined, &c.” and after pointing out the doses of medicines suited to his two species of debility, he observes, in dcxc. “ when the affection is more a mixture of both sorts of debility, these proportions of the doses must be blended together.” If direct debility be that state in which the excitability is morbidly accumulated, and indirect debility that in which a morbid exhaustion of it has taken place, in what state shall we suppose the system to be when both species of debility are conjoined! for, when the excitability and stimuli applied, are in due proportion, according to the hypothesis of Dr. Brown, it is in a state of health.

Nay, in some places, he seems to maintain that the same agent may, at the same time, induce both species of debility. In cxxxvii. he observes, "the same thing is to be said of excess of "venery, which is partly an indirect, partly a direct, always a "great, debilitating power."

Is it possible to suppose that sleep should ever be the consequence of what Dr. Brown calls direct debility, of that state of the system in which every agent produces a greater degree of excitement than in health? yet, in a variety of passages, direct debility is regarded as capable of producing sleep.*

Although Dr. Brown maintains that the mode of action of every agent on the living body is the same (cccxv. cccxvi. cccxvii. &c.) yet he is constantly obliged to admit that there is a specific difference in the effects of different agents, (ccci. cccix. &c.) Towards the end of the latter of these paragraphs, he observes, "when the "excitability is worn out by any one stimulus, any new stimulus "finds excitability, and draws it forth, and thereby produces a "further variation of the effect." If the operation of all stimuli is the same a new stimulus can produce no effect which may not be produced by changing the quantity of that first applied.

Are not the supposed states of direct and indirect debility opposite conditions of body? Can we suppose them to produce precisely the same train of symptoms? Yet Dr. Brown is constantly forced into this inconsistency. (clxi. cc. cccxxiv. &c.) In cc. he observes, "epilepsy depends likewise on debility, and the same "scantiness of fluids, only here the debility is *commonly* of the "direct kind. Fevers may arise from indirect debility, as in the "confluent small-pox, or where drunkenness has been the principal exciting noxious power applied, but at the same time the "most frequent cause of fever is direct debility."

Various similar inconsistencies might be pointed out. In stating the hypothesis of Dr. Brown, we must regard the spirit of his writings, and overlook the passages which cannot be reconciled to the doctrines in general maintained in them.

When we consider the comprehensive nature and simplicity of this hypothesis, and that many of the facts on which it appears to rest, are such as we every day experience in our own bodies, we may account for its having laid hold of the minds of all who were not wedded to former systems. On a closer view, however, it will be found, if we except that part of it which was universally admitted by Physicians before Dr. Brown's *Elementa Medicinæ* appeared, that, so far from being a legitimate deduction from facts, it is as unfounded as the hypothesis of any other writer on this subject.

* Appendix, Note 23.

I shall follow the same mode of arrangement, in the following observations on Dr. Brown's system, which has been adopted in giving an account of it.

All agents, according to this system, are stimuli. Every thing capable of producing any change in the living body excites the action of the muscular or nervous system, or both; and, in proportion as it excites them, exhausts their excitability. There is no agent, therefore, capable of diminishing the excitability, without occasioning previous excitement. Let us consider if this be a fact.

It seems, indeed, to be a law of the living solid, that every agent applied in a certain degree acts as a stimulus to it; and the subsequent exhaustion is proportioned to the excitement it occasions. Applied in other degrees, however, the same agent acts no longer as a stimulus. Distilled spirits received into the stomach, for example, occasion excitement, and, to a certain extent, the greater the quantity, the greater is the excitement; but the immediate effect of a large quantity of distilled spirits, suddenly received into the stomach, has often been instant death.

A small quantity of opium applied to the heart occasions increased excitement. A large quantity does not excite in it violent contractions, followed by the loss of its excitability, but instant paralysis, without any previous excitement.*

The first instance, then, in which this hypothesis departs from truth, is, in supposing that every thing capable of acting on the living solid is a stimulus, and consequently, that there is no agent which directly destroys the excitability.

The excitability, we have seen, is, according to Dr. Brown's system, an uniform, indivisible property of the living body, which cannot be increased or diminished in any one part, without being affected in the same way, although in a less degree, in every other.

This is true of the excitability, when the term is confined to that of the nervous system. As sensation and voluntary motion in every part of the body depend on the sensorium commune, and the excitability of this organ is affected by stimuli applied to any part of the system, every part is affected in consequence of the excitement of any one.

If we fatigue one limb, we find that we have, though in a less degree, diminished the power of every other. The exercised limb is more debilitated than other parts of the body, because it not only suffers in common with these, from the debilitated state induced on the sensorium, but the excitability of its muscles is also impaired in consequence of the contractions excited in them;

* Appendix, Note 24.

for contractions excited in the muscles of voluntary motion, through the medium of the nervous system, impair the excitability of the muscles affected, without influencing that of any other.* The excitability of the nervous system, then, may be said to be indivisible, the nervous excitability every where depending on the state of one particular organ. But the muscular excitability exists in every muscle, independently of its existence in any other.

If, for example, we apply a strong solution of opium to the denuded muscles of a limb, they are instantly deprived of their excitability, but that of every other muscle of the body remains as entire as before the application of the opium. If an animal be killed by destroying the excitability of the heart, the excitability of no other muscle is destroyed along with it. In every other part of the body, the muscular excitability is found as entire as after any other death equally sudden.†

The difference in the laws of excitability of the muscular and nervous systems, Dr. Brown either overlooked, or could not prevail on himself so far to encroach on the simplicity of his system, which he considered its chief excellence, as to acknowledge.

It was observed above, that between the healthy state, in which the excitability and stimuli applied are in due proportion, and death, in which the excitability is extinguished either by an excess or too great an abstraction of stimuli, Dr. Brown supposes all possible gradations constituting the diseases of direct and indirect debility.

According to Dr. Brown's hypothesis, a state of indirect debility is that in which the excitability is more or less exhausted, and consequently, the same stimuli produce a less degree of excitement than in health.

We need only reflect on what we observe in our own bodies to know, that, in proportion as we are subjected to the action of stimuli, we become less capable of being excited by them; and if their application is continued, the strongest fail to rouse to any further exertion till a state of sleep (during which, if it be sound, there is the greatest abstraction of stimuli which is consistent with health) has, to a certain degree, renewed the excitability. The application of the ordinary stimuli of life renders this state, during a certain portion of the day, necessary to our existence. We may delay sleep by constantly applying a stronger stimulus than that which preceded it; but in proportion as it is thus delayed, it becomes the more irresistible, and the longer its continuance must be, in order to restore the due degree of excitability.

* Appendix, Note 25.

† Note 26.

On these facts, which it is unnecessary to say were as well known before the publication of the *Elementa Medicinæ* as at present, Dr. Brown has founded the whole of his hypothesis, and has thus given to them an appearance of system which they have not in the works of any other writer. They form, as far I can judge, the only part of that hypothesis which can be admitted ; but he has so interwoven them with its other parts, that it requires some attention to make the separation.

Sleep is the only state, either healthy, or morbid, to which Dr. Brown's definition of indirect debility will at all apply ; and here it applies only to those organs on which the animal functions depend ; for those on which the vital and natural functions depend are never in a state of exhaustion. During sleep, these organs suffer no diminution of vigor but what is the consequence of the suspension of the animal functions.

The state of the heart and blood vessels, after each systole, is not that of exhaustion, as exhaustion is defined by Dr. Brown ; nor does he, indeed, suppose it to be so. That it is not a state of exhaustion might be demonstrated in various ways. It is sufficient, however, to observe, that the exhausted excitability can never be restored while the stimulus which exhausted it continues to act. A man will never recover from the fatigue of a long walk while he continues walking ; nor will the retina recover its sensibility while exposed to the same degree of light which impaired it. But the contractions of the heart continue to recur, although it is exposed to the uninterrupted action of the agent which excites them ; for, as I have frequently observed in frogs, if a ligature be thrown round the aorta, so that the heart continues uniformly gorged with blood, its fibres are still alternately contracted and relaxed, and, for the space of four or five minutes, with the same frequency as before the ligature was applied.—Thus, if we sprinkle salt upon a muscle, we do not produce permanent contraction, followed by exhaustion, but alternate contractions and relaxations, followed by exhaustion. But the state of the muscle, in the relaxation which intervenes between the contractions, is essentially different from its condition in that relaxation which succeeds them ; because, in the former case, the same agent, although its application has not been interrupted, is still capable of exciting the muscle to action.

The vital and natural functions are the powers of assimilation by which the excitability of those parts of the system which suffer exhaustion is renewed. If these powers also suffer exhaustion, to what powers in the animal system shall we attribute the renewal of their excitability !

From the nature of exhaustion, it is impossible that any exertion of these powers themselves can renew it. Every thing

which calls them into action must further diminish their excitability.

It is this objection to the hypothesis of Dr. Brown which forced him into the supposition, that a quantity of excitability, which is to last through life, is bestowed on every animal at the commencement of its existence. In forming his hypothesis he could not but perceive that, admitting every part of the system to be in a state of exhaustion, there is no power inherent in it capable of restoring its excitability. This formidable objection he found it necessary to get rid of, although at the expense of introducing into his system the most evident inconsistency.

Besides, it is impossible that the excitability of the organs on which the vital and natural functions depend, can be renewed, while the same agents which occasioned its exhaustion continue to be applied. If the organs on which the vital and natural functions depend, were subject to the same exhaustion from the stimuli that excite them, which takes place in those of the animal functions from their usual stimuli, no animal could exist above a few hours.

The excitability of the organs on which the animal functions depend is renewed during sleep, because the stimuli which occasion the exhaustion are then withdrawn, and the powers of life remain unimpaired. But if the natural stimuli occasioned exhaustion in the organs on which these powers depend, as the stimuli are never withdrawn, would not their uninterrupted application, a fortiori, prevent any renewal of the excitability.*

In disease, indeed, the organs of the vital and natural functions are often debilitated; but this debility we shall find of a nature so different from exhaustion, that excitement is a means of removing it.

What Dr. Brown says of the action of stimuli in removing exhaustion, appears to be altogether unfounded; the excitability of those organs on which the animal functions depend, the only part of the system subject to exhaustion, in the sense in which he uses this term, is most speedily and effectually restored during the absence of every stimulus which excites them.

Direct debility, according to Dr. Brown, is a state in which the excitability is accumulated, and consequently every stimulus produces a greater degree of excitement than in that condition of the system which, alone, he allows to be a state of health.

The first question which here presents itself is, what is that condition of body which he admits to be a state of health? How shall we define that state in which he supposes the excitability and stimuli applied to be in due proportion?

* Appendix, Ncte 27.

In the morning the quantity of excitability is proportionably great ; in the evening it is small ; and between these there are infinite gradations. Which of these states does Dr. Brown consider that of perfect health ?

From a review of his system, it appears, that wherever there is any addition made to stimuli necessary for preserving a state of health, a morbid degree of excitement takes place, and a condition of body, differing only in degree from the most morbid, follows. However trifling the degree of morbidity may be, according to the hypothesis of Dr. Brown it is a morbid state ; and, consequently, we are only in perfect health on awaking from sound sleep.

But what shall we say of the doctrine of direct debility, if it can be shewn, which it is surely very easy to do, that this is the state of the system in which stimuli of every kind produce the greatest degree of excitement, that in which the excitability is accumulated in a greater degree than in any other ? If it can be shewn, that Dr. Brown's definition of direct debility applies only to that state which, according to his system, is the only state of perfect health ?

We come now to the application of the hypothesis of Dr. Brown, to explain the phenomena and treatment of general diseases ; which, we have seen, turns wholly on the supposition that, in all diseases of the whole system, except those of increased excitement, concerning the general nature of which there is no dispute, the body is in one of those states which he terms direct and indirect debility.

On reviewing all that he says on the diseases of direct debility, I can find but one fact on which his opinions are founded ; and this, although at first view favourable to these opinions, if fairly examined, will not be found to afford any argument in support of them ; namely, that the animal body is strongly affected by certain agents, food and heat, when they have not, for a considerable time, been applied in the usual degree.

The mildest food will often destroy life in animals who have fasted for several days ; and a moderate temperature will produce violent effects on those who have been exposed to a great degree of cold.

Of these states of body, supposing them in the extreme, it may be observed, in the first place, that neither heat in the one case, nor food in the other, occasion excitement, which, were the excitability accumulated, as Dr. Brown supposes, they ought to do.

But, admitting that the effects of the agents are what they ought to be, according to the hypothesis of direct debility, they

will go but a short way towards establishing it. A state of direct debility is that in which all agents occasion a greater degree of excitement than in health. Do all agents produce a greater than ordinary excitement in an animal that has been exposed to hunger or cold? Instead of applying heat* to the animal that has been exposed to cold, and giving food to that which has fasted, let food be given to the former, and let the latter be exposed to heat. According to Dr. Brown, violent excitement should still in both cases, be the consequence. In both, the excitability is supposed to be accumulated; and to both powerful stimuli are applied.

But so much the reverse is the fact, that heat, in those who have fasted and are still deprived of food, and food, in those who have been exposed to cold, and are still deprived of a due degree of heat, occasion less excitement than in health. The truth is, that in animals under the operation of hunger or cold, every agent, except that whose application in the usual degree has been interrupted, produces less powerful effects than in ordinary states of the system.

The effects of every agent are, of course, proportioned to the change it induces on the body. It is not difficult, therefore to account for the effects of a temperature of 100° being more remarkable in an animal which has been exposed to that of 10° , than in one that has been exposed to a temperature of 60° ; or for a hearty meal producing more powerful effect on one that has fasted for several days than on one that has fasted for a few hours, although exposure both to hunger and cold tends to exhaust the excitability, which we know to be the case, from the effects of other agents. It is well known, that a quantity of fermented liquor, which proves a strong stimulus in a temperature of 50° , may be taken in a temperature of 15° without producing any marks of excitement: yet, in the latter case, according to Dr. Brown's hypothesis, an accumulation of excitability has taken place.

According to this hypothesis, sensation is one of the effects of stimuli. Are there any sensations more acute than the pains of hunger and cold? The sensation of cold, it is true, is occasioned by the abstraction of heat; that of hunger by the want of food; but these sensations are not the less real, and are followed by the same exhaustion which succeeds powerful sensations from any other cause.

The few facts on which the hypothesis of direct debility is founded are referable to a law of the animal œconomy, by which the body is rendered more sensible to the action of agents, in proportion as it has been previously less exposed to them. A person who has long indulged in indolence is overcome by the slight-

est exertion ; but a high temperature, or a full meal, occasions no greater excitement in him than in those accustomed to exercise.

We have instances of the same kind in the effect of the various natural agents which excite the different organs of sense, light, noise, sapid and odoriferous bodies. An animal which has lived long in the dark is strongly affected by light : One which has been long accustomed to quietness is disturbed by the least noise : The palate that has been habituated to insipid articles of diet is strongly affected by animal food : And the inhabitants of a pure atmosphere are sensible of odours which are unperceived by those of a large city. But in none of these instances is the body rendered more sensible to any other agent, than that whose application, in the usual degree, has been interrupted.

The hypothesis of direct debility supposes, that the abstraction of any one of these agents renders the system more sensible to every agent, and that the effect of all is, at all times, excitement.

The facts are, that the abstraction of any one of these agents only renders the body more sensible to the action of that agent ; and the effect of that agent is not always excitement, but either excitement or atony, according to the degree in which it is applied, and the state of the body at the time of its application, that is, according to the change it induces.

If the change is moderate, it proves a stimulus ; and, within a certain range, the greater the change the greater is the excitement. Beyond this, as we have been in the instances of opium and distilled spirits, it occasions debility ; and, when excessive, death.

When the change induced is consistent with the health of the parts on which the agent acts, excitement is the consequence ; but when the change is sufficient to derange the mechanism of the living solid, if I may use the expression, its immediate effects are debility or death. Nor is this more remarkable of the agents which are directly applied to the living solid, than of those whose first impression is on the mind. The passions, within a certain degree of intensity, act as stimuli ; beyond this they debilitate, and even extinguish life, without previous excitement.

The degree of exhaustion which follows the operation of any agent is always proportioned to the excitement it occasions ; but the degree of atony which a greater quantity of the same agent produces bears no proportion to its exciting power. Thus tobacco will not occasion the same degree of excitement which opium or distilled spirits do, but it is better fitted to produce atony.

Of those agents whose first impression is on the mind, some, grief, fear, disgust, are ill calculated to excite, although, when present only in a small degree, they act as stimuli ; but they are chiefly calculated to produce atony ; others, love and joy, on the contrary, produce much excitement, and only occasion atony when in excess.

With respect to what Dr. Brown says of the depressing passions, as it makes a part of his hypothesis of direct debility it must fall with that hypothesis : unless we allow that grief, fear, &c. occasion an accumulation of excitability, there is nothing which Dr. Brown says on this subject that can be admitted. According to a law of the animal œconomy, I have just had occasion to mention, those under the operation of grief are rendered more sensible to joy, and those under the operation of fear to confidence ; but they are rendered less sensible to the operation of every other agent. His assertion that grief is only a less degree of joy, and fear nothing more than a diminution of confidence, is quite gratuitous. He might with equal reason assert, that confidence is a diminution of fear, and joy a less degree of grief. The one set of passions are as positive agents as the other ; and if the one tend more to excite, and the other to depress, it is only what is true of agents of every other species.

The morbid states above considered, namely, those arising from the effects of cold and hunger, are the supposed states of direct debility, of which Dr. Brown speaks with most precision. It is unnecessary particularly to consider any of the others, because one observation applies to all of them ; there is none in which many agents do not produce as little or less excitement than in health, therefore there is none in which the excitability is accumulated.

With regard to the diseases in which Dr. Brown supposes the system to be in a state of diminished excitability, a similar observation applies to them ; there is no general disease in which the system is rendered less sensible to the action of all agents. In typhus, it is less sensible to that of opium and wine ; but a degree of exercise or heat, which would not incommode us in health, is, in this disease, often capable of destroying life.

The diseases which Dr. Brown terms sthenic, and which consist, in a morbid degree, of excitement, he falls into the error of regarding as only a greater degree of the same excitement which prevails in health, in the same way as he supposes the diseases of indirect debility only a greater degree of the same exhaustion which produces sleep. But as the latter does not bear the character of exhaustion ; neither does the former, which is always followed by atony, bear the character of healthy excitement.

That excitement only is healthy which occasions a tendency to sleep. The debility it produces, we have seen, affects only the

organs on which the animal functions depend. Whether these organs are in a state of excitement or exhaustion, the powers by which the body is preserved are equally unimpaired. The latter cannot partake of the alternation of vigilance and sleep.

Morbid excitement, on the other hand, debilitates the vital as well as the animal functions. Every part of the system is enfeebled, and, instead of the organs on which the animal functions depend becoming uniformly less sensible to the various stimuli which excite them, they become preternaturally sensible to those stimuli, while the vital organs become proportionably less sensible to the action of their stimuli; and the consequence, as might have been foretold, instead of sleep, is a painful and restless watchfulness. These circumstances are here simply stated as facts; the manner in which they are to be explained will be considered in the next Chapter.

Upon the whole, the following, as far as I am capable of judging, are the facts which Dr. Brown overlooked in forming the great outlines of his hypothesis.

There is no accumulation of excitability beyond that which constitutes a state of the most perfect vigor. There is no exhaustion of excitability, in the sense in which Dr. Brown uses the term, beyond that which constitutes the most perfect sleep, and both are equally states of health.

Every agent is capable of producing either excitement or atony, according to the degree in which it is applied.

In health, the natural agents applied in the usual degree, viz. a certain temperature, a certain quantity of exercise, &c. always occasion that kind of excitement which is followed by exhaustion.

In general disease, that is, in fever, which is the only general disease properly so called,* the state of the excitability is so changed, that the same agents do not produce a greater or less degree of the same effects they produce in health, as Dr. Brown supposes; but either atony, or that kind of excitement which is followed by atony.

It must appear, I think, to every one who attentively considers the hypothesis of Dr. Brown, that its author, in speaking of diseases, has constantly in view the healthy state of the animal body; and attempts, in vain, to apply the laws which regulate the excitability of certain parts of the system in health, to explain the phenomena of disease.

* Appendix, Note 29.

CHAP. II.

Of the Proximate Cause of Fever.

THE functions of the animal body have been divided into three classes ; the vital, the natural, and the animal.

There is an evident impropriety in this division. While the nature of the two first sets of functions differs so essentially from that of the third set, that nothing can be more evident than the line of distinction ; the vital and natural functions so run into each other, that it is impossible to draw any precise line between them.

The objection is strengthened, when we consider the offices of the different sets of functions. By the animal functions, the individual is connected with the external world ; by the vital and natural, his own existence is preserved.

We again see the impropriety of the division, if we turn our attention to the sources from which the organs of these functions immediately derive their power. The animal functions depend immediately on the brain and its appendages. The vital and natural functions, though influenced by the state of the nervous, depend immediately on the sanguiferous system, and are perfectly performed where the brain has never existed, as in the case of foetus born without the head.

It may also be observed, that of the vital and natural functions the animal is unconscious ; of the animal functions he is not only conscious, but many of them are subjected to his will.

The organs of these different sets of functions, we have seen in the preceding Section, possess different kinds of excitability suited to the purposes they serve. Those of the vital and natural functions on which life depends, possess an excitability which never suffers any diminution except in disease, nor complete exhaustion except in death. Those of the animal functions which suffer intermissions that they may relieve the vital organs on which their action depends, possess an excitability which suffers a constant alternation of exhaustion and renewal ; for it is only for a certain length of time that the vital can, without interruption, support the action of the animal organs.

The vital and natural functions, then, are similar in their nature ; have for their object the preservation of life ; are performed independently of the will or consciousness of the animal ; and immediately depend on organs which possess an excitability that continues unimpaired through life.

The animal functions are not concerned in the preservation of life. They have for their sole object to connect the animal with the external world ; are subjected all to the consciousness, many to the will, of the animal ; immediately depend on organs of which the other functions are independent, and which possess an excitability subject to a constant alternation of exhaustion and renewal.

The division of vital and natural functions, therefore, if adopted at all, can be regarded only as a subdivision. But it will be found more convenient, I believe, wholly to set aside this division, which seems to be of little use, and divide the functions into those which are necessary for the preservation of life, which we may call *vital*, and those by which the animal is connected with the external world, which, for want of a more appropriate term, may be called *animal*.

The one set of these functions is evidently designed for the support of the other. The end of animal life is to feel and communicate enjoyment : The animal functions, or, to speak more accurately, their immediate organs (which, to save repetition I shall call *animal organs*, in contradistinction to the organs properly called *vital*), are the immediate instruments of both ; and they are maintained by the vital organs, whose office is to form and nourish them, and, when their vigor is exhausted by the impressions which excite them, so that they cease to act, to reëit them for receiving and answering those impressions.*

It is evident, therefore, that when the vital organs are debilitated, the animal organs necessarily partake of the debility. It is equally evident why the converse of this is not true, the nervous system may be debilitated without affecting the powers of circulation. Thus when any cause impedes the action of the heart, the brain immediately partakes of the disorder ; but even in apoplexy the pulse is generally strong and good, and only becomes slower and more languid in proportion as the respiration, which is performed by muscles that depend for their vigor on the influence of the brain, becomes so.†

Thus it is that in diseases properly termed nervous, the pulse is generally good, however great the languor and depression of strength may be ; nay I have even found, from experiments made for the purpose of ascertaining this point, that the total destruction of the nervous system produces no immediate effects on the action of the heart, nor in any other way affects its motion than necessarily happens in consequence of the interruption of respiration.‡

* Appendix, Note 30.

† Note 31.

‡ Note 32.

The heart is possessed of little sensibility, so little indeed that abscesses and ulcers are often formed in it without giving any pain ; * and is, considering the size and importance of the organ, scantily supplied with nerves, the use of which seems to be to convey from the sensorium to the heart certain impressions, not to give vigor to an organ which we find in a state of perfect vigor, where no sensorium has existed.†

It appears from what has been said in the preceding part of this Essay, that the terms excitement and exhaustion, in the sense in which Dr. Brown uses these terms, apply only to the animal functions, and are merely expressions for the healthy states of vigilance and sleep. There is no debility which can be induced on the animal organs while the vital retain their vigor, which is to be regarded as morbid, because, under such circumstances, the vigor of the former is always restored by sleep.

But if the excitement of the animal organs be continued till it occasions debility in the vital organs, which support it, a state very different from exhaustion is the consequence. The steps by which exhaustion is changed into this state, which may properly be termed atony, are easily traced.

A certain excitement of the animal functions continued for a certain length of time, occasions a tendency to sleep. This tendency increases as the excitement is protracted, as long as the sanguiferous system properly performs its functions. But if the excitement is continued beyond this point, a degree of restlessness comes on. Instead of a healthy action of the heart and arteries, their pulsations gradually become more feeble and frequent, and the various functions, all of which depend more or less directly on the sanguiferous system, shew a corresponding debility.

The tendency to sleep at length ceases, sleep being no longer capable of restoring vigor. It is in vain to abstract light from the eyes and give rest to the limbs, the powers which should renew the excitability of the animal organs are themselves in want of refreshment.

The only means of restoring these powers to a due action, is applying to them a stimulus stronger than the natural stimulus, in proportion as their excitability is less than it ought to be ; for the system, it is evident, possesses no organs by which the vigor of those of assimilation, that is, of the vital organs, can be restored.

The application of a preternatural stimulus to them, is the unavoidable consequence of their debility : for the secreting organs no longer performing their functions, the more irrita-

* Appendix, Note 53.

† Note 54.

ting and noxious parts of the blood, which ought to be expelled from the body, are retained, and soon excite the heart and blood vessels to an action as powerful as the healthy action, often more so.

It is to be recollected, that all debilitating causes applied to the vital organs are felt most in those parts which are least vigorous, that is, at the greatest distance from the heart.*

These, to avoid circumlocution, I shall call the circumference of the vital system ; the heart and larger vessels I shall call the centre. Of the former are composed the different secreting organs. Hence debility of the vital system is first indicated by a failure of the various secretions.

If the increased action of the heart and larger vessels, as frequently happens, by applying an increased stimulus, restores vigor to the circumference of the vital system, the action of the secreting organs will be renewed, the offending matter expelled, and health restored. If not, the preternatural excitement of the heart and larger vessels must necessarily go on till the debility extends to them ; and there being now no longer any means of excitement in the system itself, if the debility induced be considerable, the animal dies. Death may frequently be prevented by exciting the heart and arteries by artificial means, until they have restored power to the capillaries.†

I have been considering the affects of too violent or long continued excitement of the animal organs. It is evident, however, that similar effects may be produced in two other ways. If we suppose a noxious power received into the sanguiferous system capable of debilitating the heart and blood vessels, whether previous excitement of the animal organs has taken place or not, the same want of vigor in the excretories, and increased action of the heart and blood vessels, will ensue. These symptoms, and their consequences, may also take place without any debilitating power applied to the heart and blood vessels ; for these remaining in their natural state, if any cause impede the proper action of the excretories, the same increased action of the sanguiferous system will take place, but it will not be preceded by equal marks of debility, but only by those which attend the failure of the excretion.‡

It appears, then, that when a debilitating cause is applied to the vital system, the extreme parts of this system lose their tone ; that in consequence of this, secretion being impeded, a preternatural stimulus is applied to the heart and larger vessels, which, by exciting them, tends to restore tone to the capillaries,

* Appendix, Note 35.

† Note 36.

‡ Note 37.

in the same way that an increased action of the larger vessels of an inflamed part tends to restore tone to the capillaries of that part.* On this principle, I believe, the whole phenomena of fever may be explained; to establish this position, it will be necessary to review these phenomena, which I shall do under the three heads of the Symptoms, Causes, and Cure of Fever.

Of the Symptoms of Fever.

The symptoms of fever may be divided into those of increased excitement and those of debility; and each of these sets of symptoms may be subdivided according as they indicate derangement in the vital or animal organs.

As the state of the animal organs depends on that of the vital, we find, provided there is no disease which immediately influences the former, that the excitement of the one set of organs always corresponds with that of the other. If the vital organs are debilitated, the animal organs partake of the debility; if the vital organs are preternaturally excited, the animal organs are affected in a corresponding manner. When this coincidence is observed then, and there is no other evident cause affecting the animal organs, we infer that the vital organs are primarily affected, because their affection is capable of producing the whole phenomena.

At the commencement of fever, when the pulse becomes weak, small, frequent, perhaps irregular; when the breathing is feeble, frequent, and interrupted with sighing; when the features and other extreme parts shrink; when the various secretions begin to fail, the tongue becoming clammy, the throat dry and rough, the appetite being impaired† with increased thirst and constipated bowels, the urine limpid and in small quantity, and the skin cold, pale, dry and shiveled; the patient, at the same time, complains of a general sense of debility; the limbs totter, the tongue trembles, the mind becomes feeble, unsteady, and anxious, the strength and acuteness of the different organs of sense are impaired, the sight wavers, the hearing is confused, the smell and taste often lost, and the feeling indistinct, a degree of numbness frequently affecting the limbs, and a sense of cold and creeping being referred to various parts of the body. Such are the symptoms with which fever makes its attack—those of an enfeebled circulation with the various consequences, which we could have foretold would attend it.

By degrees we see this state of general debility changing to one of a different nature. After the various excrementitious

* Appendix, Note 33.

† Note 39.

matter, which should have been thrown out of the body, has for some time been retained. the pulse begins gradually to increase in strength, and the breathing becomes fuller and less feeble; the blood is now impelled with vigor into the extreme vessels; the paleness, shrinking, and coldness of the skin, is succeeded by turgescence, redness, and heat; instead of the feebleness which attends the first stage, the muscles acquire a preternatural vigor; the sensibility, instead of being impaired, is now morbidly acute;* and various other symptoms, denoting an increased force of circulation, gradually shew themselves.

This general effort of the system restores the vigor of the secreting organs, and all that should have been gradually separated from the blood is now forced off at once by the alimentary canal, kidneys and skin. Loose stools frequently occur; the urine becomes copious, and is loaded with the peculiar salts which the kidneys secrete from the blood, while the skin is bathed in sweat, highly charged with the saline substances thrown off by this organ. Thus the stimulus which roused to preternatural action the central parts of the sanguiferous system, by which vigor was restored to its circumference, is removed, and health restored.

A degree of general debility, it is true, prevails, but the action of the extreme vessels is so far restored, that it is in due proportion to the remaining vigour of the heart and larger vessels. In short, what now takes place throughout the system is analogous to what happens during resolution in an inflamed part. The extreme vessels are capable of effecting the necessary changes in the fluids supplied to them by the larger vessels. Thus even the general debility which succeeds fever is a wise provision of nature; and thus it is that the debility of the capillaries, and along with it the fever, is often renewed for some time after it has ceased, by too full a diet, exercise, or any other cause that increases too much the force of the heart and larger vessels, and thus throws on the capillaries a larger quantity of the fluids than on the first return of their vigor they can easily bear. A full meal, under these circumstances, is often succeeded by a strong pulse, and a dry skin.

Such is the course of a simple attack of fever; and surely no train of symptoms appears more simple, or admits of a more easy explanation on the best established laws of the animal œconomy. Let a debilitating power (such as we know many of the causes of fever to be) be applied to the vital organs, all the foregoing train of symptoms necessarily follow, unless the increased action of the heart and larger vessels fails to rouse to their natural action

* Appendix, Note 40.

the extreme parts of the circulating system, that is, to restore the due vigor of the secreting organs.

Various symptoms, then, gradually unfold themselves, all of which, we shall find, are evident consequences of want of vigor in those organs. These, like the symptoms of the more simple form of fever, may be divided into those of increased excitement, and those of debility.

When the debility of the extreme vessels is such, that the increased force of circulation excited by the retention of what the excreting organs should have thrown out of the body, is unable to restore their action, the preternatural excitement of the heart and larger vessels must go on till they themselves fall into a state of debility. The period at which this debility supervenes, and the violence of the excitement which precedes it, depend on the vigor of the habit, and, as we shall presently see more particularly, on the nature of the cause which produces the fever.

It hardly ever happens, however, that the increased action of the heart and larger vessels is wholly ineffectual. In the space of a few hours, they rouse to a more or less perfect action, the various excretories, in consequence of which, part of the irritating cause is thrown off, and a mitigation of the symptoms follows. But on the abatement of the action of the central parts of the sanguiferous system, the capillaries again falling into a state of debility, the accumulation of what should be excreted again takes place, and the various symptoms of excitement are renewed. Thus fevers, which last more than a day, consist of a series of remissions and exacerbations.

As the debility of the extreme vessels is overcome with more difficulty the more frequently it returns, the excitement, during the exacerbations for the first days, gradually increases in violence, till by degrees the excitability of the heart and larger vessels being impaired, the symptoms of excitement gradually give place to those of debility.

The symptoms of excitement, in continued fevers, differ only in degree from those of a simple paroxysm. The symptoms of debility differ in kind as well as in degree.

As the paroxysms recur, the pulse becomes stronger and more rapid, the respiration more hurried and frequent, the heat greater, the face fuller and more florid, the eyes more turgid with blood, and incapable of bearing the light, and the headach, throbbing of the temples, and tinnitus aurium more troublesome,* and from the greater heat, and the increasing debility of the secreting organs, the skin, mouth and throat more arid.

* Appendix, Note 41.

Delirium much less frequently arises from excess of excitement than from debility, and in the first paroxysm of fever the excitement is seldom such as to produce it. As the excitement increases, however, in the succeeding paroxysms, it sometimes supervenes, and then rises to a degree beyond what we usually meet with in debilitated states of the system, the patient becomes frantic, and is with difficulty retained in bed.

In violent excitement it is not unusual for some of the smaller vessels to be ruptured by the excessive action of the heart and larger arteries; hemorrhagies thus occur from the nose, ears, lungs, rectum or uterus, and lessen the excitement. It may be remarked, that when the excitement is considerable, we rarely meet with hemorrhagy from the eyes, skin, bowels, or urinary passages, from all of which they are so common in states of extreme debility.

The symptoms of excitement are few and simple; those of debility numerous and complicated. One cause of which is, that excessive excitement never continues long. However powerful the exciting causes may be, the excitement soon arrives at that point beyond which the powers of the system cannot raise it. Debility, on the contrary, is of long continuance; during its influence, there is time for various changes to take place.

The pulse, from the lessened tension and weaker pulsation of the heart and arteries, becomes soft, small, weak, and more frequent. It is not difficult to perceive the final cause of the beats of the heart generally becoming more frequent when they are enfeebled, for the feeble systole not propelling the same quantity of blood, or not propelling it with the same velocity, a more frequent systole becomes necessary in order to support a due vigor of circulation.

As the debility increases the pulse, becomes irregular, as well as weak. The enfeebled heart now and then refuses to be roused to any action, so that an intermission of the pulse takes place, or it is roused only to a tremulous and irregular action, occasioning a fluttering pulse, or its action is languid and unequal, and the pulse becomes undulating.

As the debility increases, the beats of the heart at length fail to rouse to action the more distant arteries, themselves in a state ill calculated to obey the stimulus. The pulse in the extremities then ceases, and they become cold, and the coldness gradually extends, till the heart ceasing to beat, it soon becomes general.

The state of the breathing corresponds with that of the circulation. It is weak, frequent, and interrupted with sighing; but when, from the increasing debility of the heart and blood vessels, the rapidity of the circulation is much reduced, it often becomes

slower than natural, being now and then interrupted for a considerable time.* It becomes difficult from the feebleness of the muscular powers which support it, and often rattling, from relaxation of the exhaling and inactivity of the absorbing system.

Under these circumstances we are not surprised to find the voice low, weak, wheezing, and often shriller or hoarser than usual.

The secreting and absorbing powers in every part of the body necessarily partake of the state of the circulating system. In proportion as these powers are diminished, the various secreted fluids become subject to the spontaneous changes which they undergo when uninfluenced by the contact of a living surface, by which the noxious parts being continually absorbed, and new parts secreted in their stead, they are preserved in a state of health.

Hence, in fevers of some continuance, the mouth is clammy, and the thinner parts being carried off by the air, its mucus becomes tough, brown, fætid, sometimes black, and adheres firmly to the teeth, lips, and other parts of the mouth. In the advanced stage, if the tongue is not covered with brown or black mucus, it often appears of a shining dark red or purplish colour, from the debility and consequent relaxation of its extreme vessels; in either case it frequently becomes dry, and deep chaps are formed in it, the speech being rendered inarticulate.

The mucus of the trachea and bronchiæ is subject to the same changes, rendering the breath dry, hot, and offensive.

A considerable change happens in that of the œsophagus, deglutition being often impeded by the dryness of the passage, as well as the debility of its muscles; and a failure of secretion is indicated in the stomach and bowels by thirst and costiveness.

In all these appearances, however, there is considerable variety; for when the extreme vessels are greatly relaxed, the thinner fluids flow from them copiously. Thus the mouth is often moist to the fatal termination; and an ichorous, or even bloody diarrhœa frequently supervenes, the relaxation being so great as to permit the passage of the red particles, in the dissolved state in which they now exist in the blood, the consequence of there being no renewal of the component parts of this fluid, the powers of absorption and secretion being suspended.

The same states of the vessels are indicated by corresponding appearances of the urine. It is high-coloured and scanty, or more copious, ichorous, or bloody. The skin, in like manner, is dry and contracted, or relaxed and moist; and blood is sometimes mixed with the sweat.

* Appendix. Note 42.

All the hemorrhages which occur in the advanced stage of typhus are of the same nature with those just mentioned, and are, for the most part, symptoms of great danger, both as indicating great debility of the circulation, and as the means of increasing that debility. In the worst cases of typhus, indeed, blood, or rather a thin serum in which more or fewer of the red globules are broken down and suspended, sometimes runs from almost every surface of the body, whether internal or external.

When blood thus extravasated is retained beneath the cuticle, it forms the spots and stains called *petechiæ*, *vibices*, &c.

A greater degree of the debility which occasions these symptoms, gives rise to mortification, which appears in the worst kinds of fever, and which is to be regarded in no other light than a partial extinction of life; and accordingly we find it most common in the extremities, where the circulation is most feeble, or on the parts on which the patient rests, where it is apt to be interrupted by the pressure.

To a person acquainted with the symptoms of this disease, it is almost unnecessary to point out how exactly the various functions of the nervous system correspond with the state of the vital organs. Hence the uneasiness and confusion of mind which so constantly attend the foregoing symptoms. In proportion as the pulse loses its strength and becomes irregular, the mind becomes feeble and unsteady, till at length it is incapable of any exertion, and is carried along with whatever idea presents itself.*

Corresponding changes take place in the various organs of sense; depraved taste, smell, hearing, and sight, particularly the last, are among the most frequent symptoms of the advanced stage of fever. The taste and smell, indeed, are often depraved, independently of any affection of their nerves, from their peculiar secretion being vitiated.

The powers of voluntary motion must partake of the state of the nervous system. They become weak and irregular. Sometimes in particular parts of the body are wholly lost, or the muscles are affected with twitching and starting, and often with more violent convulsions. It is to be recollected that great debility of the brain disposes to convulsions. They supervene on syncope from a fatal loss of blood, and frequently on other states of great nervous debility.

As the debility increases, a retention of urine, from a paralysis of the bladder, involuntary discharges of urine and feces from that of the splinters, loss of deglutition, &c. supervene. The cause of such symptoms is too evident to require any comment.

* Appendix, Note, 43.

On the nature of those symptoms, which have given rise to the opinion of a putrescency of the fluids, it will be necessary to make some farther observations. Dr. Cullen, in the 68th paragraph of his First Lines, remarks, "that the production of human and marsh effluvia is favoured, and their power increased, by circumstances which favour putrefaction, and they often prove putrefactive ferments with respect to the animal fluids. As putrid matter, therefore, is always with respect to animal bodies, a powerful sedative, so it can hardly be doubted that human and marsh effluvia are of the same quality ; and it is confirmed by this that the debility which is always induced seems to be in proportion to the other marks that appear of the power of those causes ;" and, in the 105th paragraph, he observes, " the symptoms denoting a putrescent state of the fluids are, 1st, With respect to the stomach, the loathing of animal food, nausea and vomiting, great thirst, and a desire of acids.

" 2d, With respect to the fluids: 1st, The blood drawn out of the veins not coagulating as usual: 2d, Hemorrhagy from different parts, without marks of increased impetus: 3d, Effusions under the skin, or cuticle, petechiæ, maculæ, and vibices: 4th, Effusions of yellow serum under the cuticle.

" 3d, With respect to the state of the excretions, foetid breath, frequent loose and foetid stools, high-coloured turbid urine, foetid sweats, and the fetor and livid colour of blistered parts.

" 4th, The cadaverous smell of the whole body."

From what has already been said the reader will perceive that the foregoing symptoms are readily accounted for without supposing any other putrescent state of the fluids than that which necessarily arises from the debility of the vital powers.

The first set of symptoms, the loathing of animal food, nausea, vomiting, thirst, and a desire for acids, arise from a failure or vitiated state of the secretions, are common to all kind of fever, and as strongly marked in synocha. in which no putrescency of the fluids can be suspected, as in typhus.

Of the second set of symptoms, I have already had occasion to observe, that the hemorrhagies and effusions so common in malignant fevers are readily accounted for by the relaxed state of the solids, and the blood being thinner than in health, a change that naturally arises from the powers of absorption and secretion being impaired, and the blood consequently partaking of the change it undergoes when these cease altogether. While the animal lives, however, this change never goes so far in the circulating fluids, as to occasion fetor in them.

With respect to the remaining symptoms, when the various functions are much impaired, the contents of the stomach and

alimentary canal stagnate. These form no part of the living body. They are as apt to become putrid as the same matter out of the body exposed to the same degree of heat and moisture, unless the antiseptic fluids are supplied to check this tendency. They therefore become putrid in fevers of long continuance, and the more readily if there be present a considerable portion of bile which is a septic.

A similar change takes place on the surface of the body. The failure of the due secretion and absorption there, causes a stagnation and putrefaction of the natural moisture. Hence the putrid smell of the sweat. This also happens in parts which have been blistered, in ulcers, &c. so that it is not difficult to account for the cadaverous smell of the body, without supposing any putrefactive ferment in the circulating fluids. And if those labouring under typhus are more subject to gangrene than people in health, this only proves that in them the vital powers are more languid, and consequently apt to fail.*

II. *Of the Remote Causes of Fever.*

Respecting the causes of fever it will only be necessary to shew that they are all such as occasion debility of the vital organs, and that all causes which debilitate these organs produce fever.

All causes which excite violent and long-continued exertions of the animal organs are found to produce this disease. Any exertion of the muscles of voluntary motion too long continued, excessive venery, long watching, intense study, violent passions, pain, or any other species of fatigue, are among the most powerful causes of fever; and we shall find, in speaking of the treatment of this disease, that from whatever cause it may have arisen, every thing which excites the animal organs tends to increase and prolong it, because they cannot answer the stimulus without farther exhausting the vital organs. These causes I would term indirect, because they act through the medium of the animal organs.

The other causes of fever act immediately on the vital organs. The most simple of these are such as tend to deprive these organs of their usual stimulus. This may be done either by abstracting part of the blood, or by preventing the formation of a due quantity. Thus it is that profuse evacuations, long fasting, and all diseases which prevent for a certain length of time the necessary supply of chyle, occasion fever.†

Other causes of fever operate by applying to the vital organs a preternatural stimulus, the immediate effects of which are fol-

* Appendix, Note 44.

† Note 45.

lowed by debility. Thus the excessive use of opium,* or fermented liquors, occasions fever. If the quantity of these is only such as to stimulate, without subsequent debility, fever does not take place. The pulse indeed becomes stronger and fuller, and the heat is increased, but the suspension of the secreting powers, and the other symptoms of fever, do not follow, and the diseased state of the pulse and increased heat are only temporary. The noxious matter is soon expelled by the excretories, and the heart and blood vessels regain their healthy action. But if the preternatural excitement goes on till it occasions debility in these organs, the secretions fail, and all the symptoms of fever gradually shew themselves.

To the same head, the causes of fever acting directly on the vital organs, belong the most frequent of all these causes, cold and contagion. To be convinced that these act by debilitating the vital organs, we have only to take a view of their immediate effects, and of the circumstances in which they are most apt to excite fever.

It would be superfluous to adduce any proofs of cold below a certain degree being a debilitating power.† This degree is different at different times, according to the state of the body, and the circumstances under which the cold is applied.

A degree which is easily resisted by a strong and vigorous habit, will debilitate a feeble one, and an uniform application of cold continued only for a short time, and applied at a time when the body has not previously been exposed, at least for a considerable time, to a much higher temperature, will be resisted; when a more partial, or longer application of cold, especially after exposure to a high temperature, will occasion debility. Damp clothes are the most pernicious mode of applying cold, probably from its being confined to the surface where the circulation is most apt to fail;‡ while a cold air is applied equally to the surface and to the lungs;|| and from its being of long continuance. Such are the circumstances under which cold is most apt to debilitate the vital powers, and precisely under these circumstances it is found most apt to occasion fever.

Dr. Cullen observes, in the 94th paragraph: "The circumstances of the cold applied, which seem to give it effect," that is, in producing disease, "are, 1st, The intensity, or degree of the cold: 2d, The length of time during which it is applied: 3d, The degree of moisture at the same time accompanying it: 4th, Its being applied by a wind or current of air;" this circumstance seems only to operate by occasioning a more sudden and partial abstraction of heat: "5th, Its being a vicissitude, or sudden and considerable change of temperature from heat to cold.

* Appendix, Note 46.

† Note 47.

‡ Note 48.

§ Note 49.

“ The circumstances of persons rendering them more liable to
 “ be affected by cold, seem to be, 1st, The weakness of the sys-
 “ tem, and particularly the lessened vigor of circulation occa-
 “ sioned by fasting, by evacuations, by fatigue, by a last night’s
 “ debauch, by excess in venery, by long watching, by much study,
 “ by rest immediately after great exercise, by sleep, and by pre-
 “ ceding disease: 2d, The body, or its parts, being deprived of
 “ their accustomed coverings: 3d. One part of the body being
 “ exposed to cold while the rest is kept in its usual, or a greater
 “ warmth.

“ The power of these circumstances is demonstrated by the
 “ circumstances enabling persons to resist cold. These are a
 “ certain vigor of constitution, exercise of the body, the presence
 “ of active passions, and the use of cordials.” To the powers
 enabling the body to resist cold, Dr. Cullen adds, the presence of
 other impressions and habit. These of course tend to obviate
 the effects of all agents.

With respect to contagion, little acquainted as we are with its
 nature, we know that it is a debilitating power. This appears
 from the sources from which it originates from its immediate
 effects, and from the states of body most favourable to its opera-
 tion.

Many diseases, the small pox, measles, &c. we never see pro-
 duced by any other cause but contagion; and it was a question
 once much agitated among physicians, whence these diseases
 originated, for the contagion seems to arise from the disease
 itself. The question seems only capable of being answered by
 the supposition that such diseases, though afterwards propagated
 by their peculiar contagions are at first produced independently
 of contagion by a concurrence of causes which do not often take
 place. Hence we see in the history of medicine accounts of con-
 tagious diseases disappearing, and at some future period again
 shewing themselves, or of others appearing in their stead.*

Whatever may be the difficulty of tracing the source of many
 contagious diseases, that of typhus is sufficiently apparent. A
 very simple concurrence of causes is capable of producing this
 disease. It may arise in any crowded and ill-ventilated place,
 (even brutes are subject to it under these circumstances,†) or
 from putrid effluvia applied in certain quantity, and for a certain
 length of time from whatever cause.

The first effects of the contagion of fever, as we might have
 expected from the nature of these sources, are symptoms of de-
 bility. At the commencement of a contagious fever there is a
 general prostration of strength, the pulse is small and feeble, the

* Appendix, Note 50.

† Note 51.

extreme parts of the circulating system performing their functions very imperfectly. The mind is unsteady, and the vigor of the muscles of voluntary motion much impaired.*

We have seen that general debility, however induced, may occasion fever; it will not, therefore, seem surprising that all causes of debility are favourable to the operation of contagion; fear, and other depressing passions, or the debilitating effects of the more powerful exciting passions, a scanty diet or intemperance, indolence or fatigue, a very close and warm, or a cold damp atmosphere, render the body more liable to infection. Even the temporary debility from the stomach being empty, and sleep, in which the circulation is more languid than when we are awake, nay, the slight debility occasioned by a disgusting odour, have been observed to produce the same effect. On the same principle, convalescents are found more liable to infection than people in health.

These remarks are well illustrated by the observations of a variety of writers, and particularly by Dr. Lind, in his Treatise on Fevers and Infections. He observed, that those who had been slightly exposed to contagion often escaped the fever, if not soon after subjected to the action of debilitating causes; and that many who were recovering from contagious fevers, their bodies not yet free from the contagion, had the fever renewed by such causes.†

When, on the other hand, we take a view of the means of preventing infection, we find that all those which have proved at all efficacious are such as tend to support the vigor of the vital organs, equanimity and confidence, a generous but moderate diet, in which is included a proper quantity of wine, regular exercise, an interesting but not fatiguing application of mind, tonic medicines judiciously administered, that is, in such a way as shall not oppress the stomach nor disorder the bowels, and the cold bath so employed as not to overpower the strength.

From the foregoing cursory view of the causes of fever, it appears that they are all such as more or less directly debilitate the vital system. The immediate operation of some appears to be on the centre of this system, the heart and larger blood vessels; of others on the circumference, the capillary vessels; and of some equally on all parts of the system.

When the debilitating cause acts on the extreme parts of the vital organs, we find the symptoms of debility slight, and the excitement which succeeds comparatively great, the cause of which is sufficiently evident. The debility of the extreme parts of the circulation is never so immediately felt throughout the system as that of organs more immediately essential to life, and the vigor

* Appendix, Note 52.

† Note 53.

of the heart and larger vessels remaining unimpaired, they are readily excited to increased action by the retention of what should have been thrown off by the capillaries. Thus it is that increased excitement is the characteristic feature of fever from cold, whose operation is on the extreme parts of the sanguiferous system.

When, on the other hand, the debilitating power is applied to the heart and larger blood vessels, the symptoms of debility must be great, compared with the degree of excitement; for the debilitating cause being applied to the organs most immediately necessary to life, its effects are quickly felt in every part of the system;* and the debility of the extreme parts of the sanguiferous system being secondary, the retention of the matter which should be excreted by them is neither so sudden nor so complete as in the former case, nor are the heart and larger vessels, with which the debility originated, in a state so well fitted for excitement, as when the debilitating cause operates only on the capillaries. Hence it seems to be that in fevers from contagion, debility is the leading feature.

It may be difficult to prove that the first operation of contagion is on the heart and larger vessels, yet the arguments afforded, both by the symptoms which characterise the commencement of typhus, and by analogy from the phenomena of other contagious fevers, leave little room to doubt it. The small pox, for example, when the contagion is very active, commences with a train of symptoms so similar to the commencement of typhus, that they can hardly be distinguished, but it commences with the same train of symptoms, whether it is received in the natural way or by inoculation.

Now in the inoculated small pox we are assured that the first impression of the contagion is on the heart and large vessels, for the fever does not commence till matter is formed in the inoculated part and received into the sanguiferous system by means of the absorbents; and it would seem that in typhus and the natural small pox a certain time is required, as in the inoculated small pox, before the contagion, to whatever part applied, occasions the secretion of such a matter as, when absorbed, shall produce the disease.†

In fever from the third set of causes, those which act equally on every part of the vital organs, we do not perceive either the excitement or debility so predominant at the commencement, as the one or the other is in the preceding cases. Thus in fever from a poor and scanty diet, for example, or from chronic diseases, which impede the due formation of chyle, the symptoms gradually show themselves without any very marked debility or excitement; for here all the vital organs being equally and gradu-

* Appendix, Note 54.

† Note 55.

ally debilitated, there is no sudden retention of the excreta to excite to powerful action the heart and larger vessels nor are they, from partaking of the debility, in a state to be greatly excited; and, on the other hand, as no debilitating power is suddenly applied to the heart and larger vessels, the sudden debility which attends the commencement of typhus is not observed.

III. *Of the Treatment of Fever.*

If we admit the accuracy of the preceding observations, the principles which should conduct the treatment of fever are sufficiently obvious, and the practice at which we thus arrive, we shall find experience has pointed out to be the best. It has, however, been unsteady, complicated, and ill-defined, owing, as far as I can judge, to these principles having been mistaken, or but imperfectly understood.

We have seen that the debility of the vital system may be induced not only by debilitating powers immediately applied to it, but also by too great and long-continued excitement of the animal organs. We hence infer that this debility having taken place, any excitement of these organs must increase it.

We have also seen, that debilitating powers immediately applied to the vital system, produce fever, whether they make their first impression on its circumference or central parts; and in endeavouring to restore its vigor, we shall find, that the means of cure admit of the same division.

It appears, from what has been said, that although the circumference of the vital system is always in a state of debility in fever, the centre is often in that of increased excitement, namely, while sufficient excitability remains in the heart and larger vessels to occasion a preternatural excitement of them by the stimulus of the retained excreta. We shall, therefore, find that while at all periods of fever the means of exciting the circumference of the vital system are indicated, those of exciting the centre are only proper in the advanced stages.

It farther appears, as in the case of inflammation, that although the increased excitement of the heart and larger vessels is evidently favourable to the restoration of vigor in the capillaries, yet it will often, when there is great difficulty in exciting the capillaries, and thus expelling the preternatural stimulus, become so violent and be so long continued as to occasion debility of the central parts of the vital system, instead of restoring circulation to its circumference; or, if this be in some degree effected, it is more than compensated by the subsequent debility of the centre, which soon extends to the circumference. Under these circumstances, so far from employing means further to excite the

heart and larger vessels, our practice must be directed to restrain their action.

In the treatment of fever, then, there are two indications which may be termed general, because they apply to all fevers and to all their periods, namely, to avoid the excitement of the animal organs, and to excite the circumference of the vital system ; and two, which may be termed partial, because they apply only to certain states of fever, namely, to diminish the excitement of the heart and larger vessels when it is above the due degree, and to increase it when it falls below that degree.

The first indication in fever, then, is to remove every cause which may excite the animal organs. Of this indication little need be said. Every one knows of what importance it is in all kinds of fever to keep the patient quiet and still, and, when the symptoms are severe, whether those of synocha or typhus, to avoid as much as possible impressions of every kind. Not merely the excitement of the different organs of the senses, as they are termed, but much heat, the irritation occasioned by food in the stomach and bowels, when the powers of digestion are suspended, or too long a retention of the natural excretions of the latter, the continuance of thirst, in short, every thing that excites sensation, is injurious.*

To the second general indication belong many of the most important parts of the treatment of fever. It has from the infancy of medicine been observed, that increasing the action of the skin often removes fever ; but it is only lately that we have been taught how this ought to be done. When the patient was confined to a hot room, and loaded with bed cloaths, if a sweat were induced it was the consequence of relaxation from the exhausting effect of temperature, not of a return of vigor, and so far from being accompanied with the good effects of spontaneous sweating, it almost always did harm, by leaving the skin in a more debilitated state than before its appearance, not to mention the injury done by the painful impressions occasioned by this mode of treatment.

We now excite the action of the surface by forcibly propelling the blood towards it by emetics, or by diaphoretic medicines, particularly the preparations of antimony and some neutral salts ; for it is to be observed, that the means which excite the natural action of the skin are much more powerful in relieving fever than those which produce sweat, during which this organ seems always to be rather in a state of relaxation than of vigor,† we succeed better with tartrate of antimony than with the compound powder of ipecacuanha ; and, for the same reason, we succeed better by the

* Appendix, Note 56.

† Note

application of cold than by the heating regimen. I need not here point out the great advantage of cool air in fever, and the excellent effects of the application of cold water, employed in the manner recommended by Dr. Currie.*

In warm weather the skin is more relaxed ; in cold weather it is more vigorous. Even when the relaxation occasioned by warm weather goes so far as to produce sweat, the secreting power of the skin is not so great as under a due degree of exercise in a cold atmosphere. This appears both from the state of the urine, from which, as I have explained in a note just referred to, the degree of activity of the skin may be ascertained, and from the greater appetite in the latter case. Now a state of fever comes in place of exercise, it supports the proper warmth of the body under the application of cold to its surface, and secures the good effects of the latter ; for the application of cold to the surface is never proper in fever when the temperature falls below the healthy degree, and is most successful when it is considerably above it, provided the skin is dry. In short, it is most successful in fevers in the same circumstances in which it is found in health most to excite the action of this organ, only in the one case the increased temperature is supported by exercise, in the other by a preternatural stimulus applied to the heart and blood vessels.

Analogous to the office of the skin, the external surface of the animal system is the office of its internal surface, if I may use the expression, the alimentary canal ; and such is the sympathy between these surfaces, that if one is languid the other is affected in the same way ; and if we excite either, we at the same time, in a greater or less degree, increase the action of the other. If the bowels are constipated, we find the skin dry and shrunk ; as soon as the bowels are restored to action, the skin becomes soft and moist, and vice versa ; except when, the secretion by the skin being suddenly stopped, the fluid which should have passed by it is thrown on the bowels, applying to their vessels a stimulus which prevents their inactivity.

We might therefore, a priori, have expected considerable advantage in fever from exciting the bowels, not to mention that their vessels form so large a portion of the circumference of the vital system. Every physician must have observed the excellent effects of supporting the due action of the bowels in fever, particularly in its early stages ; but no other writer has placed this subject in so clear a point of view as Dr. James Hamilton,† of Edinburgh. I have found the most decided advantage from exciting catharsis to the extent which he recommends.

Such are the chief means of exciting the capillaries in fever. Others have been proposed, particularly rubbing the surface

* Appendix, Note 58.

† Note 59.

with warm oil, which, in certain fevers, is said to be very successful. Of this, which appears a doubtful practice, from the heat and irritation which must attend it, we have had no experience in this country.

In the early stages of almost all fevers which last above a few hours, it is necessary, with the preceding means, to have recourse to such as are calculated more directly to lessen the increased action of the heart and larger vessels, and consequently the debility which succeeds this action.

As the means which excite the capillaries tend to throw off the cause of preternatural excitement in the heart and larger vessels, and as by the evacuation which they occasion they tend to reduce the volume of the blood, the remedies we have just been considering, it is evident, with their other good effects, must reduce the excitement, and are sometimes sufficient for this purpose.

We more directly diminish the stimulating quality of the blood, by diluting it by a plentiful supply of any mild fluid, and by the use of acids and certain neutral salts, which seem to act rather in this way than as diaphoretics, particularly acetat of kali, and nitrat of soda.

When these fail sufficiently to diminish excitement, we are obliged to have recourse to venesection, the most powerful means of diminishing both the volume and stimulating quality of the circulating fluids; for it is to be recollected, that as the red blood is abstracted by this operation, the whole mass is rendered thinner and less stimulating. The precautions to be kept in view in the employment of venesection, and the circumstances which render them indispensable, I have detailed at length in the first volume of my Treatise on Fevers.

Our view in the commencement of fever, is not to reduce the action of the heart and larger vessels to the natural standard.—This would be obviating the means which we have seen the nature of the circulation affords for removing the cause of the disease. It is only our object to lessen excitement when it goes beyond the degree most favorable to this end; for we observe in fever, that when the excitement, in consequence of the difficulty of restoring action to the capillaries, runs very high, the heart and larger blood vessels themselves are soon debilitated, and the disease assumes a more formidable appearance, the various symptoms which indicate a general debility of the vital system supervening; but that, when their action is restrained, so that a longer continued though more gentle stimulus is applied to the extreme vessels, it more frequently proves successful.

If however the means employed for this purpose be so injudiciously directed as to reduce the excitement of the heart and lar-

ger blood vessels more than is necessary to insure the requisite continuance of that excitement, a double injury is done. Not only the stimulus necessary to the excitement of the capillaries is removed, but the debility of the heart and larger vessels is hurried on, and the fever soon begins to assume its worst form.—Hence the incalculable injury done by the indiscriminate use of the lancet, till lately so common in the commencement of fever.*

Physicians seem insensibly to be substituting a free discharge by the bowels, for venesection, at this period of the disease ; and this change has not arisen from any reasoning on the subject, but from experience having taught them, that it is the more successful practice. The nature of fever itself, however, might have pointed it out. It must appear, even at first view, of how great importance it is to save the strength in this disease, and particularly to preserve the mass of blood as entire as possible, at a time when the system is incapable of forming more.

Now by catharsis, only the thinner and less important part of the blood is abstracted ; by venesection, the most important, both because it is the most essential to vigor, and the most difficult to be renewed. Every motive dissuades us from having recourse to the latter, while, it is in our power, as in almost all the fevers, properly so called, of this country, to produce the desired effect by catharsis.

These arguments in favour of catharsis are sufficient, not to mention, that by this evacuation, as I have just had occasion to observe, we directly rouse to action a large portion of the debilitated capillaries, and by sympathy tend to excite those of the skin.

It is not to be denied that venesection is sometimes necessary at the commencement of simple fever. In tropical climates, in particular, the excitement is often so excessive, that if allowed to go on it will even in a few hours reduced the system to a state of extreme debility. Here catharsis is too feeble a remedy ; and, precarious as the alternative is, we must abstract the more stimulating and vital parts of the blood.

To this peculiarity of the fevers of such climates we may chiefly, perhaps, attribute their great fatality ; and such is the perplexity which it has occasioned to practitioners, that we find the best and most experienced in doubt whether the effects of the excitement, or of the means necessary to relieve it, are most to be dreaded.† If we might venture to give our opinion from what we observe in the fevers of this country, we should say, that most of those who have written on the fevers of tropical climates have

* Appendix, Note 60

† Note 61.

been too sparing in the use of cathartics, which are indicated, not merely for the reasons just pointed out, but by the peculiar state of the biliary system, which almost always attends the fevers of warm climates.*

To the state of increased excitement, whatever be the mode of treatment, or nature of the fever, if it last above a day or two, always succeeds that of debility. The action of the heart and larger vessels now falls below, as in the first stage of fever it rises above, the healthy degree. If we cannot sufficiently excite them, the debility of the circumference increasing with that of the central parts of the vital system, the powers of life are at length lost in the former, and death gradually extends to the centre.

This part of the treatment of fever seems at present the most defective; no writer, as far as I know, having laid down any rules by which the treatment of what may be called the second stage of fever, can be confidently regulated.

The feeble state of the circulation and the temporary good effects of powerful stimuli have led most physicians, and particularly those of later times, to employ them with great freedom. Many, however, confess that they have been disappointed in their effects;† of this number, I can feel no hesitation in declaring myself to be one. I have found the second stage of fever most tractable when all powerful stimuli were avoided.

It is true, indeed, that large quantities of opium, or wine, will often give a degree of vigor, increasing the strength and lessening the frequency of the pulse. But these effects are transitory. It is soon necessary to repeat the remedy, and at length to increase its power, in order to procure the same effects; and this transitory vigor seems frequently obtained at the expense of exhausting the strength, which, had it been more carefully husbanded, might have carried the patient through his disease.

Were I to state the result of my own experience in the second stage of fever, it would be, that opium is only useful when small doses allay irritation, and procure composure, if not sleep; and that wine is rarely beneficial if given in larger quantity than might be taken in health without subsequent debility, and can seldom, perhaps, be given without injury even to this extent.

Whether there are states of fever in which large doses of these stimuli may be of advantage, it is difficult to say. In extreme debility, when the patient is almost in *articulo mortis*, a strong stimulus may sometimes, perhaps, by rousing the languid system, be the means of preserving life. I have frequently seen the experiment made with temporary, never with permanent good effects.

* Appendix, Note 62.

† Note 63.

Is there reason to expect permanent good effects from increasing the quantity of oxygen in the air which the patient breathes ?*

There is another class of stimuli employed in the second stage of fever which have obtained the name of tonics, which occasion less, but more permanent excitement, and on these accounts seem better adapted to this disease.

Some of these, particularly the cold infusion of bark, or, if this occasion heat and irritation,† that of columba, with a little wine, if of the stronger kinds diluted, and, when there is any appetite, light food, taken in small quantities at a time ;‡ a careful attention to cleanliness, ventilation, and the state of the bowels, a cool atmosphere, and when the temperature of the body is decidedly above the healthy degree, the application of cold water to the surface, form, according to my experience, the most successful treatment of the second stage of fever.

It is hardly necessary to observe, that I speak here of the general plan of treatment. Various remedies are occasionally indicated by the appearance of certain symptoms arising from local affections, the treatment of which, as they are not essential to fever, do not fall under the general plan of cure.

Universal experience has ascertained, that the more powerful means of exciting the capillaries, if we except the application of cold to the surface, should form no part of the treatment of the second stage of fever, the cause of which is sufficiently evident. With this exception, they all necessarily occasion more or less evacuation, which ought, now, as much as possible to be avoided.

In the first stage of fever, our view is to restore tone to the capillaries ; in the second, to the whole vital system

* Appendix, Note 64.

† Note 65.

‡ Note 66.

APPENDIX.

NOTE 1.—**I**T was soon observed by physiologists, that the animal body, by its peculiar mechanism, tends to correct any injury it may sustain, and to expel any noxious matter introduced into it. If, instead of food, indigestible substances be received into the stomach, they are generally rejected by vomiting, or expelled by an increased peristaltic motion of the bowels. If these are injured by the passage of such substances, other motions are excited to repair this injury. If a thorn is introduced under the skin inflammation and suppuration ensue, and the discharge of matter continues till the whole of the offending substance is washed out. This property of the animal body has long been known in the schools by the name of the *vis medicatrix nature*; and in medical reasonings, very unwarrantable uses have been made of it.

It would appear, at first view, that the attempt to ascertain whether a disease be an effect of the *vis medicatrix*, must be an important and very necessary inquiry, that we may not counteract its salutary efforts : but the difficulty of ascertaining what symptoms are to be referred to its agency, and still more the uncertain tendency of these symptoms, which are sometimes too feeble to overcome the cause of the disease, and sometimes so violent as to endanger life, has rendered this inquiry of but little use in practice.—Were we, for instance, to trust to the salutary efforts of nature when poison is received into the alimentary canal, we should find, in many instances, that the motions excited would not be sufficient to expel it. In others, these motions would become so violent and long continued, that they would exhaust the strength, after the cause which excited them was removed. In the one case, we must, by artificial means, increase the efforts nature, in the other, restrain, and at length allay them. In short, we must use the means which our knowledge of the animal œconomy teaches us will speedily, and without injury to the system, expel the offending cause ; and we trust no farther to the operations of nature than we find them conducive to these ends.

It appears, indeed, from the works of those times, when the operations of the *vis medicatrix* were most studied, that this study has rather injured than improved the practice of medicine. It not only induced Physicians to rely too much on the efforts of the system, and rendered them averse to the use of active medicines; but it threatened to put a stop to all rational inquiry respecting the nature of diseases. Every symptom, which could not otherwise be accounted for, was referred to the operations of this power; and Physicians supposed they had sufficiently explained the nature of a disease when they said it was an effort of the *vis medicatrix*. But supposing them right in this conjecture, it would have gone but a short way towards ascertaining the nature of the disease. To return to the illustration of poison, it would be of little use for us to know that it is expelled by an effort of nature, if we are not at the same time informed of the steps by which nature expels it. Without this knowledge could we at all understand the disease, or regulate the efforts, excited?

Besides, those who wish to abridge their labour by a reference to the *vis medicatrix naturæ*, forget that it is only after we understand the nature of a disease that we can say whether it is a salutary effort of the system or not. They assume principles for the purpose of explaining the nature of a disease, at a knowledge of which they cannot arrive until its nature is understood. The result of our inquiry may be, that it is an effort of the *vis medicatrix*; but it is impossible that any reference to this power should assist us in the inquiry.

One would naturally suppose that when Physicians had convinced themselves that all diseases were only efforts of nature, to expel some noxious agent, or restore vigor to some debilitated part, they would have thought it worth their while to inquire by what steps she effected these ends. But this was too severe a task.—Accustomed to expatiate in the regions of fancy, they could not stoop to the painful attention which an unbiassed observation of nature demands, nor be satisfied with the slow advances which an inquiry of this kind admits of.

But although they were confined on one side, on another there was still sufficient room for conjecture; although they could not explain the manner in which the *vis medicatrix* operates, they could speculate on the nature of this power. Hence arose the celebrated doctrine of Stahl and his followers, who maintained that the *vis medicatrix* is the immediate operation of the mind, which, independently of any influence necessarily communicated to it by the state of the body, perceives, by its own intelligence, the injuries done to the body, and excites such motions as are calculated to correct these injuries and obviate their consequences. In the present day it would be very superfluous to enter on any refutation of an hypothesis so unfounded and inconsistent. Even

to spend time in stating it, would require some apology, did we not find among its advocates such men as Mead, Gaubius, and Porterfield.

NOTE 2.—In the yellow fever of America, Dr. Linning observes, that the urine often shews the critical sediment on the very first day, which he uniformly found a bad symptom; and the more copious the sediment was, the worse, he remarks, was the prognosis. See Dr. Linning's Letter to Dr. Whytt on the Yellow Fever of South America, in the 2d Volume of the Essays and Observations, Physical and Literary.

One of the most fatal fevers, of which we have any account, is the *Ephemera Britannica* described by Caius; the leading symptom of which was a profuse flow of sweat, from which it received the name of *Sudor Anglicus*. See Caius, *De Ephemera Britannica*.

NOTE 3.—Sweats of this kind, Dr. Jackson informs us, are often the forerunner of death in the yellow fever of Jamaica. Other tropical writers make similar observations, and even in this country no Physician can practice long without seeing them confirmed.

NOTE 4.—If the reader has seen the account of Dr. Brown's hypothesis, in the first volume of my Treatise on Fevers, he may probably remark, that its merits are there estimated more highly than in the work before him. The truth is, from its having been the favourite system among the students of the University of Edinburgh, at the time I studied, I had conceived a strong prejudice in favour of it before I was capable of estimating its merits, and it was long before I could persuade myself that it had in fact made no real addition to our knowledge.

The passages I shall have occasion to quote from Dr. Brown's works, I shall give from his own translation of the *Elementa Medicinæ*, corrected by Dr. Beddoes.

NOTE 5.—In the following notes the numbers refer to the paragraphs of Dr. Brown's Elements of Medicine, and the Greek letters to the sections of the paragraphs.

For the sense in which Dr. Brown uses the term excitability, see x, xi, xii, xiv, &c.

NOTE 6.—See Dr. Brown's Elements of Medicine, paragraph clxvii.

NOTE 7.—See Dr. Brown's Elements of Medicine, paragraph xix.

NOTE 8.—Dr. Brown supposes the action of all stimuli to be the same, differing only in degree; he, however divides them, in different parts of his work, in three different ways, into universal and local, diffusible and natural, or durable, and direct and indirect. “The effects common to all the exciting powers, are sense, motion, mental exertion, and passion. Now these effects being the same, it must be granted that the operation of all the powers, is the same.” See xv. “Stimuli are either universal or local. The universal stimuli are exciting powers, so acting upon the excitability as always to produce some excitement over the whole system. The appellation of universal is convenient to distinguish them from the local. The local stimuli act only on the part to which they are applied, and do not, without previously occasioning some change in it, affect the rest of the body.” See xvii, *α*, *ε*, *γ*.

Dr. Brown uses the terms natural, or durable stimuli, in contradistinction to diffusible, by which he means the stronger stimuli, such as distilled spirits, musk, volatile alkali, æther opium, &c. See civ, cv, cvi, cxxvi, cxxx, *φ*, and ccxc. “The stimulus of the articles of diet, not exclusive of the diffusible stimuli, should be denominated direct, because it acts directly, and immediately on the excitability of the part to which it is applied. Direct stimulus, at least, in so far as it regards the food, is assisted by another stimulus depending upon distension of the muscular fibres, on which account, for the sake of distinction, the latter should be called indirect. The latter is owing to the bulk of animal and vegetable food, the former is produced by a relation or affinity of the stimulus to the excitability. The indirect acts upon the living solids in so far as they are to be considered as simple. The direct act upon them as living only.” See cxxvii, cclxviii, &c.

NOTE 9.—I have here altered, a little, the language of Dr. Brown, by substituting living solid for excitability, as the exciting powers cannot be said to act on what he has defined to be a quality. His words are, “The effect of the exciting powers acting upon the excitability may be denominated excitement.”

NOTE 10.—See Dr. Brown’s Elements of Medicine, xxiv, and various other passages.

NOTE 11.—“The sedative affections, as they are called,” Dr. Brown observes, “are only a less degree of the exciting ones; thus fear and grief are only diminutions or lower degrees of confidence and joy, not passions different in kind. The subject of the passions admits of the reasoning in every respect as that of heat; and in the same manner, all the bodies in nature that seem to be sedative, are debilitating, that is, weakly stimu-

“lating, inducing debility by a degree of stimulus inferior to the
“proper one.” Dr. Brown’s Elements of Medicine, xxi. 7.

NOTE 12.—“If the property which distinguishes living from
“dead matter, or the operation of either of the two sets of pow-
“ers” (that is, either the external agents, or those which exist in
the body itself) “be withdrawn, life ceases; nothing else than
“the presence of these is necessary to life.” Dr. Brown’s El. of
Med. xiii.

NOTE 13.—“Whether the excitement has been increased or
“diminished in a particular part, and whether its diminution has
“been owing to direct or indirect debility, and in either way the
“sthénic diathesis has been produced, all the rest of the body
“soon follows the kind of change which has taken place, because
“the excitability is an uniform, undivided, universal property of
“the system.” clxvii. “And must we, giving up our funda-
“mental principle, after so compleat an establishment of it, allow
“that the excitability is not the same uniform, undivided property
“over all the system,” &c. ccxxxii. See also a note belonging
to this paragraph. Dr. Brown, however, admits, that although
the excitability is always affected in the same way in all parts of
the system, yet it is affected in a greater degree in that part on
which the stimulus acts than in any other.

NOTE 14.—See Dr. Brown’s El. of Med. xviii, xxiv, xxxix. In
one of these paragraphs he observes, “This mutual relation ob-
“tains between the excitability and excitement, that the more
“weakly the powers have acted, or the less the stimulus has been
“applied, the more abundant the excitability becomes. The
“more powerful the stimulus, the excitability becomes the more
“exhausted.” In xxxix, he observes, “in this case the excitabili-
“ty becomes abundant; because in consequence of the stimuli be-
“ing withheld, it is not exhausted,” &c. See what is said of sleep
“in ccxxxix.

NOTE 15.—See Dr. Beddoes’s Observations on this part of the
Brunonian System, in the Introduction to his edition of Dr. Brown’s
Elements of Medicine.

NOTE 16.—“The debility arising from defect of stimulus may
“be called *direct*, because it is not produced by any positive nox-
“ious power, but by a subduction of the things necessary to sup-
“port life.” xlv. For an account of this species of debility, see
various parts of the Elem. Med. particularly the xxxviiith and
eight following paragraphs.

NOTE 17.—“The excitability thus exhausted by stimulus con-
“stitutes debility, which may be denominated *indirect*, because it

“ does not arise from defect, but excess of stimulus.” xxxv.
For an account of this species of debility, see a variety of passages in the Elem. Med. particularly the xxviii and ten following paragraphs.

NOTE 18.—See an account of the diseases of debility, Elem. Med. from diii. to dcxcv.

NOTE 19.—See Elem. Med. ccli. In cccxxviii. Dr. Brown observes, “ to every sthenia, to all sthenic diseases, increased excitement over the whole system is a common circumstance ; it appears during the predisposition, in an increase of the functions of body and mind ; and after the arrival of disease, in an increase of some of the functions, a disturbance of others, and a diminution of others, in such sort that the two latter phenomena are easily perceived to arise from the noxious powers that produce the former, and to depend upon their cause.” See an account of diseases of excitement from cccxxviii to ccccliii.

NOTE 20.—See Elem. Med. cvi, &c. and the mode of treatment in sthenic diseases from ccccliii to diii.

NOTE 21.—In dclxxxviii, Dr. Brown observes, “ In direct debility, where the redundancy of excitability does not admit of much stimulus at a time, ten or twelve drops of laudanum every quarter of an hour, till the patient, if, as is usually the case in such a high degree of debility, has wanted sleep long, falls asleep. Afterwards, when some vigor is produced both by that and the medicine, and some of the excessive excitability worn off, a double quantity of the diffusible stimulus should be added, and in that way gradually increased, till the healthy state can be supported by stimuli, less in degree, more in number, and more natural.”

NOTE 22.—In dclxxxvii, Dr. Brown observes, “ when indirect debility has had more concern in the case, as in agues, or more continued fevers, occasioned by drunkenness ; and in the confluent small-pox ; the same remedies are to be employed, but in an inverted proportion of dose. We should consequently set out here in the cure with the largest doses, such as are next in effect to that degree of stimulus which produced the disease ; then recourse should be had to less stimuli, and a greater number of them, till, as was said just now, the strength can be supported by the accustomed and natural stimuli.”

NOTE 23.—See Elem. Med. cci, &c. If it be said, that the Brunonian system does not suppose that stimuli necessarily occasion a greater degree of excitement when the system is in a

state of direct debility than in health, what shall we understand by the excitability being accumulated in the former case? Is there any other test of the excitability's being accumulated but the greater degree of excitement produced by the same stimuli? It is true, indeed, Dr. Brown often loses sight of this, one of the fundamental principles of his system.

NOTE 24.—In various experiments, related in the Appendix to the fourth volume of my Treatise on Febrile Diseases, I had occasion to throw a strong solution of opium, or tobacco, into the heart. In all of them this organ immediately became paralytic.

NOTE 25.—I have found, by repeated experiments, that the convulsions excited by opium and tobacco, only exhaust the excitability of those muscles which are affected by them; and that the exhaustion is not in proportion to the quantity of opium which the animal takes, but to the force and frequency of the convulsions it excites. The convulsions excited by opium are of the same kind as those in tetanus. During the intermissions the slightest touch will renew them; and although the animal dies in nearly the same time, when the quantity of opium taken is the same, whether he is subjected to such an irritation as constantly renews the convulsions, or is allowed to remain at rest, yet in the former case the excitability of the muscles of voluntary motion is found more impaired in proportion as the convulsions have been more frequent.

NOTE 26.—I have found on applying a solution of opium to the muscles of the leg of a frog, that they have immediately lost their excitability, while that of every other muscle of the body remained unimpaired, and this, whether the animal was dead or alive.

If a solution of opium is thrown into the heart of a frog, the excitability of the muscles of the limbs will be found much impaired after death. But this I have found is neither owing to any action of the opium on these muscles, nor to any sympathy between their excitability and that of the heart, but, analogous to the result of an experiment above alluded to, (Note 25.) to the convulsions excited in them. When the aorta is either divided or secured by ligature before injecting the solution into the heart, no convulsions ensue, and the excitability of the muscles of the limbs remains as entire as after any other death equally lingering; for the convulsions which take place in this experiment, when the aorta is neither divided nor secured, do not arise, as has been supposed, from any sympathy existing between the heart and the other muscles of the body, but from the solution being conveyed by that vessel, and immediately applied to the brain.

See the experiments related in the Appendix to the fourth volume of my Treatise on Febrile Diseases.

NOTE 27.—One set of the organs, indeed, on which the vital functions depend, are subject to exhaustion, the intercostal muscles and diaphragm. These, as I shall presently have occasion to observe more particularly, (Note 31.) are as completely muscles of voluntary motion as those of the limbs. The slight degree of exhaustion which takes place after each of the moderate contractions of these muscles in ordinary respiration, is sufficiently restored by the interval of rest which intervenes between these contractions, during which the stimulus which produced them is removed. The above muscles form a medium of connection of great importance between the vital and animal functions. They are the only muscles employed in what has usually been termed the vital functions, whose stimulus acts through the medium of the brain. In all other instances the stimulus is directly applied to the muscle itself; and in all, the muscle is one of involuntary motion. On this peculiarity of the muscles of respiration, many phenomena of disease seem to depend. We shall see, in a succeeding note, in what way it influences the symptoms of apoplexy. It seems to be the cause of death in this, and in most other diseases in which the injury is confined to the brain; for it would appear from experiment, (Note 32.) that no injury of the brain can directly destroy the action of the heart.

It is a question which has been much agitated among physiologists, why some muscles are subject to the will while others are independent of it; and it has been supposed, that some of the nerves passing through ganglia is the cause of this difference. But would not a more evident explanation of it occur, were we to find on enquiry, that all the muscles of voluntary motion are excited through the brain, all the muscles of involuntary motion by stimuli, immediately applied to the muscle itself? See Note 31.

NOTE 28.—It would be more accurate here, and in other places, if custom permitted it, to follow chemical writers in the use of the term caloric. Expressing, by the same term, both the sensation, and that which causes it, is a frequent source of inaccuracy. The same objection applies to the use of the word cold: we want a term expressive of the abstraction of caloric.

NOTE 29.—Fever seems to be the only general disease properly so called. All other diseases are either simple local affections, or local affections complicated with a general affection. The only diseases which can be mistaken for simple general diseases, are affections of the heart and brain.

A local affection of the brain is known by a greater degree of delirium than can arise from the fever which attends it, or by

coma, or convulsions. A local affection of the heart is known by palpitation, or syncope. When these symptoms occur in fever, the case is to be regarded as one of general and local disease combined.

NOTE 30.—It would seem, at first view, that animal enjoyment would have been much increased, had nature enabled the vital to afford the animal organs so copious and constant a supply of excitability, that they should never have suffered exhaustion. What organs would have been necessary for this purpose we know not; but a little reflection will teach us, that animal enjoyment would no otherwise have been increased by these means than by prolonging the life of the animal. Temporary insensibility gives no interruption to enjoyment; for it is to be recollected, that as far as relates to the animal itself, perfect sleep has no duration.

NOTE 31.—I have had occasion to observe in a preceding note (27.) that if it should be found that all the muscles of voluntary motion are excited through the medium of the brain, of involuntary motion by stimuli immediately applied to the muscles themselves, we should hence have an easy solution of the question, why the former are independent of the will, and the latter subjected to it. But what is of much more importance, we should be enabled to explain many phenomena of disease, the nature of which seems obscure, and, in some degree, inconsistent with the general laws of the animal œconomy.

As far as respects the principal muscles of either class, there can be no difference of opinion: every one admits that the muscles of the limbs are muscles of voluntary motion, and that they are stimulated through the medium of the brain; and that the heart and blood-vessels are muscles of voluntary motion, stimulated by the blood which is immediately applied to them. But besides these two classes of muscles, physiologists suppose that there is a third class, which, partaking of the nature of the other two, are partly muscles of voluntary, and partly of involuntary motion.

Dr. Gregory, in the 11th chapter of his *Conspectus Medicinæ Theoreticæ*, after enumerating what he supposes to be the muscles of voluntary, and those of involuntary motion, observes, “Medium fere locum inter occupant respirationis muscoli, septum scilicet transversum, muscoli abdominis, et qui inter costas jacent, et quotquot cum costis ita conjunguntur muscoli, ut horum contractio eas vel firmare, vel elevare vel deprimere possit.” To these, most physiologists would add certain muscles which Dr. Gregory regards as muscles of involuntary motion; those of the rectum and bladder, and their sphincters.

It is true that none of these muscles are either so perfectly subjected to the will as those of the limbs, nor so independent of it as the heart and blood-vessels: on a closer view, however, it will appear. I think, that this is not owing to any peculiarity of the muscles themselves, but to the nature of their functions; and that they are all in the strictest sense either muscles of voluntary motion, excited through the medium of the brain, or of involuntary motion, excited by stimuli immediately applied to them.

Can we give any definition of a muscle of voluntary motion, but that whose action we can renew, interrupt, retard, and accelerate at pleasure? This definition applies as strictly to the muscles of respiration as to those of the limbs: nobody feels any difficulty in renewing, interrupting, retarding and accelerating their action as often as he pleases. We cannot, indeed, interrupt it for a considerable length of time, but this is not from any want of power over the muscles, but for the same reason that we are obliged to call the muscles of the arm into action when a candle is held to the fingers; in both cases we are unable to bear the sensation excited, and instinctively call into action the muscles which remove it. It is true that the action of the muscles of respiration continues during sleep, but it is for the same reason that the action of the muscles of the limbs is exerted during sleep, when a continuance of the same position causes uneasiness. The muscles of respiration, then, are muscles of voluntary motion, whose action is habitually excited by a peculiar sensation, and consequently through the medium of the brain.

Over the rectum and bladder, on the other hand, the will has no direct power, and they are never excited except by the stimulus of their contents. It is true, indeed, that they are to a certain extent subjected to the will; but it is through the intervention of other muscles, which are altogether muscles of voluntary motion. We can increase the stimulus of their contents when they are of a certain bulk, and thus call their muscular fibres into action, by gently pressing them against these contents by the action of the abdominal muscles; every one, with a little attention, may find, that without acting with those muscles, he is quite unable, at any time, to excite the action either of the bladder or rectum.—And so connected is the action of the abdominal muscles with a stimulus applied to the rectum or bladder, that when it is considerable, they are called into action against every effort of the will, in the same manner, that the whole of the muscles of voluntary motion are called into involuntary action by the operation of an emetic.

We can also, at pleasure, interrupt the action of the rectum and bladder, if the stimulus which excites it is not very powerful; but neither is this, by any direct influence, exerted on their muscles themselves, but through the medium of their sphincters, both of which are muscles of voluntary motion. It will be evident, to any one who will make the trial, that he can, at pleasure, excite, in-

interrupt, retard, and accelerate the action of these muscles. The circumstances which lead us at first view to suppose that we do not possess this power, are, that their range of action is very limited ; and their antagonists, the muscles of the rectum and bladder, only acting occasionally, they remain for the most part in a state of gentle and uniform contraction, in the same way as happens to the muscles of the one side of the face, when their antagonists, those of the other side, have become paralytic ; or to the flexors of the limbs, when the extensors are divided ; and this state of gentle contraction is as readily increased at pleasure in the sphincters, as in the muscles of the face and limbs. We have no means of lessening it, either in the one case or the other, except by acting with the antagonist muscles. In short, the sphincters of the rectum and bladder are muscles of the same nature with the orbicularis oris ; only the range of action in the two former, partly from their being of less extent, and partly from their having fewer antagonist muscles, is more limited. They are called into action for the purpose of closing the cavities of the rectum and bladder, when our sensations teach us that the contents of these cavities are discharged, and consequently are stimulated through the medium of the brain ; every one feels, as I have just had occasion to observe, that he can make this effort when he pleases, unless the stimulus applied to the rectum and bladder is so great as to overcome the efforts of volition.

It appears, then, that all the muscles of the body are either muscles of voluntary motion, excited through the medium of the brain, or muscles of involuntary motion, excited by stimuli immediately applied to the muscle itself.

By the foregoing observations some light seems to be thrown on the pathology of apoplexy. If the muscles of respiration continue to act in apoplexy, while those of the limbs have lost their power, it is not that the one set of muscles is more affected than the other, but that a powerful stimulus is applied to the brain, tending to excite the one and not the other. The patient breathes in apoplexy for the same reason that he moves his limbs when synapisms are applied to his feet ; a due supply of air being withheld from the lungs excites the muscles of respiration, in the same way that irritating the feet excites the muscles of the limbs ; and if he continues to breathe after no motion can be excited in the limbs, it is because the stimulus which excites us to breathe is stronger than any artificial stimulus we can employ. Men have held their hands in the fire till they were burned off ; no man ever voluntarily interrupted his breathing till he became insensible. But as the quantity of the stimulus necessary to excite the muscles of voluntary motion, as it acts through the brain, must be greater in proportion as the sensibility of this organ is lessened, respiration is performed more slowly in apoplexy than in health.

I speak of apoplexy, properly so called, of the disease which is induced, for example, when a man in health receives a blow upon the head which occasions compression of the brain; not of the disease which has obtained the same name arising from gluttony, the excessive use of wine, &c. where derangement of various kinds takes place; and the affection of the brain is often not the primary disease.

From the respiration being performed more slowly than in health, the change which the blood undergoes in the lungs is less perfect, and hence the blood stimulates the heart less powerfully; for it has been found by various experiments, that by this change, whatever it be, for its nature seems by no means to be ascertained, notwithstanding all that has been written on this subject, the blood is enabled to stimulate the left side of the heart. Thus it is, that in apoplexy the pulse is affected, although it appears, from what is said in the following note, that the most severe injury the brain can sustain does not directly influence the motion of the heart. The pulse becomes slow and oppressed, because the heart must be more distended by the blood, before it is excited to contract, in proportion as the blood has become a worse stimulus. The insensibility increasing, the muscles of respiration at length cease to be roused to any action; the change which the blood should undergo in the lungs is thus wholly prevented; the heart, consequently, being no longer supplied with a stimulus capable of exciting it, ceases to beat, and the animal dies. Is there not reason to believe, that an apoplectic might be preserved for some time by inflating the lungs?

In the foetal state, the animal lives independently of the brain, because the circulation in the placenta, which is performed by muscles of involuntary motion excited, not through the medium of the brain, but by stimuli immediately applied to them serves the office of respiration.

NOTE 32.—The experiments here alluded to, I have made both on the warm and cold blooded animals. The reader will find them detailed in the Appendix to the fourth volume of my Treatise on Febrile Diseases. It appears from them, that neither chemical nor mechanical irritation of the brain can directly influence the motion of the heart.

In these experiments the interruption of respiration, of course, very soon in the warm, and in no great length of time in the cold-blooded animals, weakened, and at length destroyed the motion of the heart; and when the muscles of voluntary motion were thrown into violent contractions, the heart beat more frequently. The same effects would have been produced had the muscles of the limbs been excited, and the respiration destroyed by any other cause.

It was impossible, by any irritation of the brain, to excite irregularity of motion, or in any other way directly to affect the action of the heart. Even the instantaneous and total destruction of the nervous system seemed not at all to affect the motion of this organ.

After making a hole in the cranium, and another in the lower part of the spine, in several frogs, the thorax was laid open and the motion of the heart carefully observed. A strong solution of opium in water was then injected through the hole made in the cranium in such a manner, that it passed along the spinal marrow, and part of it came out by the hole made in the spine; a mode of applying opium employed by Dr. Monro, to shew how instantaneously the nervous system may be destroyed by this drug. The animals were immediately deprived of voluntary motion, and appeared quite dead; but the motion of the heart was not in the least affected: it continued with the same frequency and vigor as before the injection of the solution.

The strongest chemical and mechanical stimuli were applied to the brains of rabbits without producing any effect on the motion of the heart but that which arose from the convulsions of the muscles of the limbs; and after the death of the animals, it continued to beat with perfect regularity, gradually becoming weaker, as necessarily happened in consequence of the ceasing of the respiration.

I made similar experiments to ascertain how far the muscular coat of the intestines which, next to the heart, may be regarded as the most important muscle of involuntary motion, can be influenced by stimuli applied to the brain, from which it appears that no irritation of the brain could at all affect its motion; while the muscles of the trunk and limbs were agitated by the most violent spasms, the peristaltic motion of the intestines remained wholly unaffected; its degree and regularity continued the same whether the stimulus was applied or withdrawn.

It has been asserted, that the motion of the heart may be affected by opium applied to distant parts of the body, and that opium applied to the heart will affect distant parts, through the medium of the brain. These opinions seem to have been founded on mistaken inferences from certain experiments which admit of a different explanation. But to enter on this subject, and the experiments by which the opposite opinions are, as far as I can judge, unequivocally established, would lead into too long a discussion. I must, therefore, refer the reader for it to the Appendix just alluded to.

A question may here occur, perhaps:—If the peristaltic motion of the bowels is uninfluenced by the state of the brain, why

is apoplexy almost uniformly attended by constipation? The rectum, we have seen, is never called into action without the previous excitement of the abdominal muscles, and these are only called into action in consequence of a peculiar sensation. (31.) It is not difficult, therefore, to explain the constipation which accompanies apoplexy, where both sensation and the power of the muscles of voluntary motion are so much impaired. The contents of the rectum not being regularly expelled, the whole intestines become inactive, and their contents soon acquire a greater than due consistence by the absorption of the thinner parts.

Why the heart and alimentary canal should be insensible to mechanical and chemical stimuli applied to the brain, and yet so sensible to mental stimuli, we shall never, perhaps, be able to explain.

As it would appear from the foregoing experiments, that we cannot influence the motion of the heart by the most powerful stimuli applied to the brain, so in tracing, as far as we can, the formation of the animal body, we find reason to believe that the former organ and some of its vessels perform their functions before the nervous system exists. The heart and umbilical vessels are the first parts observed in the formation of the chick in the egg. See Malpighi, *De Ovo Incub.* and Harvey, *De Generat. Animal.* And in viviparous animals, the heart is vigorous while the brain is but imperfectly formed; and, indeed, as has already been observed, in monstrous cases, where the brain is never formed. When these observations are compared with what we see in the perfect animal, that by means of the sanguiferous system the various parts of the body are constantly nourished and renewed, does it not seem probable that the power of the heart and vessels is employed in the original formation of the other organs?

NOTE 33.—That the heart is not wholly insensible, we know from the pain which sometimes attends its diseases. Thus, in the *Anatomia Practica* of Bonetus, we find cases in which considerable pain was excited in the heart from worms fixing themselves on it. Lib. II. Sect. 8, Obs. xix, Obs. xxv, § 2, &c. In other instances, however, mentioned by the same writer, the heart sustained the most severe injuries unattended by pain. In the section just referred to, a case is related, in which a worm was found, on dissection, adhering to the right ventricle. It was the cause of death; yet the only remarkable symptom was violent palpitation returning at intervals. Obs. xxv, § 3. See also Sect. 10, Obs. vii. The same writer gives cases of ulceration of the heart unattended by pain; some unattended either by pain or palpitation. Lib. II, Sect. 10, Additamenta, Obs. ii. In one instance, in which the patient died with only the usual symptoms of bilious fever, with a very intermitting pulse, a calculus was

found in the heart. Lib. II. Sect. 19. Obs. xxxix. The reader will find similar cases in Morgagni's Epistle on the Diseases of the Heart, in his work, *De Caus. et Sed. Morb.* But not having this work by me, I cannot refer to the particular passages.

NOTE 34.—It is said, that in fœtus born without the brain the nerves are larger than usual; and it has been supposed by some, that in such cases they perform the functions of the brain. When, however, we consider the nature of these functions, no conjecture can appear more improbable. All the phenomena of the nervous system seem to prove that the brain alone is the active part of it, the nerves being little more than means of conveying its influence in the one direction, and in the other, the impressions which excite it.

NOTE 35.—That all causes debilitating the vital system are most felt in the extreme parts of it appears, from a great variety of phenomena, and seems to arise from two causes.

1st, The excitability of the capillaries being more readily exhausted than that of the heart and larger vessels. This is very observable in making experiments on living animals. I have found, with the assistance of a microscope, that a degree of irritation, which produces no sensible effect on a vessel of perhaps, the twentieth part of an inch in diameter, deprives the capillaries of all power. Thus, rubbing the skin, or gently warming it, will so far exhaust the power of the capillaries that they will yield beyond the healthy degree to the *vis a tergo*, and become distended with red blood. It is only in this way we can explain the result of some experiments of Dr. Fowler in his *Th. de Infl.*

2d, The nature of the circulation. Although the power inherent in the arteries themselves tends, doubtless, to propel the blood through them, yet it appears from the pulse that the influence of the heart is felt throughout the whole arterial system, and is a chief means of exciting its action.

A debilitating cause, then, applied to the heart, is most felt in the capillaries, because they are most distant from this organ. A debilitating cause applied to the whole circulating system, is most felt in them, both because they are most distant from the heart, and because their excitability is more easily impaired than that of any other part of this system.

NOTE 36.—The *vis a tergo* supplies the stimulus which excites every part of the sanguiferous system. The heart contracts in consequence of being distended with blood thrown into it by the veins. The arteries are excited by the blood propelled into them by the heart, and its impulse is supported by the power of these vessels, and conveyed to the extreme parts of the circula-

ting system. Thus the capillaries are excited; and when by any cause their excitability is impaired, an increase of this natural stimulus is the most probable means of rousing them to action.

In inflammation, for example, in which the excitability of the capillaries is impaired, as may readily be seen with the assistance of the microscope, the larger vessels of the inflamed part are excited to increased action. The natural stimulus which excites the capillaries being thus increased, the inflammation is often removed.

The difference between inflammation and fever seems only to be, that in the latter the debility of the capillaries is general, in the former it is confined to one part. In the one the debilitated vessels are greatly distended, because the increase of the *vis a tergo* is great, compared with the number of vessels debilitated, in the other, the whole capillaries being debilitated, the distending power bears a much smaller proportion to the resisting. When, however, the increased action of the heart and larger arteries is great, the state of the capillaries in fever approaches to that of the capillaries of an inflamed part, the various surfaces appearing redder, more turgid, and much hotter than natural. Hence it is, that in this state of the system inflammation so readily supervenes. For if any cause occurs to add to the debility of the capillaries of a particular part, distention more readily ensues than when the action of the heart and larger vessels is less excited.

NOTE 37.—A debilitating cause acting on the central parts of the sanguiferous system, we have seen, is soon felt in its circumference. Experience also evinces, what the general laws of the animal œconomy, indeed, would have led us, a priori, to suppose, that debility of the circumference is always more or less felt in the central parts of this system. The diminished vigor of the secreting organs, therefore, is always attended with general debility till the retained excreta have accumulated in sufficient quantity to apply a preternatural stimulus to the heart and larger vessels.

NOTE 38.—In the Introduction to the second part of my Treatise on Febrile Diseases, I have endeavoured to prove, by direct experiment, that inflammation consists in the debility of the capillaries, and that it can only be removed by restoring their action. The larger vessels of inflamed parts are in a state of increased excitement, and the additional stimulus thus given to the capillaries appears to be the means which nature uses to remove the disease. The nature of fever, I have had occasion to observe in a preceding note, seems to differ from that of inflammation only in the one being a general and the other a local affection. All the differences of their symptoms, as well as modes of treat-

ment, may easily be traced to this cause. In the first stage of both, our view is to excite the capillaries, and thus restore the due balance of excitement between them and the larger vessels. In the second stage of these diseases, our view in both, is to restore tone to the whole vital system. When the inflammation has assumed a tendency to gangrene, and the pulse has lost its firmness, and when synocha has changed to typhus, the principle of the treatment is the same.

NOTE 39.—So much does the appetite depend on the presence of the gastric fluid in the stomach, that we may at will destroy the appetite, as I have found by experiment, by clearing the stomach of it. We have reason to believe, that in complete anorexia there is no secretion of this fluid. I have found the stomach in such a case wholly destitute of it.

NOTE 40.—This state can be regarded in no other point of view but as that of general, though moderate inflammation of the surfaces. Did it appear in only one particular surface, nobody would hesitate to give it this name. See Note 35.

NOTE 41.—The consequence of a more rapid circulation is, that the blood is sent more frequently through the lungs, and thus becomes more arterious. From this cause, and from the blood's being propelled in greater quantity into the superficial vessels during the hot fit of fever, the colour of the skin is more florid than natural. By these causes also the sensibility is increased. On the same principles, we readily account for the paleness and diminished sensibility in the cold stage of fevers, in which the powers of the circulating system being impaired, the blood becomes less arterious, and is impelled with less force towards the various surfaces. It is to be observed, that these causes operate doubly, on the parts affected and on the brain, on the state of which the sensibility of every part depends. From the latter operation arises the feebleness of the muscles of voluntary motion in the cold, and their irregular vigor in the hot stage, of fever.

NOTE 42.—The frequency of the breathing is *cet. par.* proportioned to the rapidity with which the blood passes through the lungs. Hence it is that the breathing sometimes becomes extremely slow towards the fatal termination of many diseases, particularly of those in which the sensibility is much impaired. I have seen a patient under these circumstances breathe only once in three or four minutes for the last quarter of an hour of his life.

NOTE 43.—Language has been defined to be the means by which we communicate our ideas to each other; but it also seems to be the chief means of their arrangement, and even the source

of a large proportion of them. We find, that those who have always been deaf, and consequently dumb, are generally of weak intellects, unless they have obtained some substitute for language; and a large proportion of them are idiots. This will not appear surprising when we consider attentively the advantages we derive from language. Words are originally the mere signs of our ideas; but, like the letters in Algebra, which are the signs of quantities, other uses are made of them besides that of merely representing our ideas. By habit, the words themselves acquire certain relations towards each other, and we use them without recalling to the mind the particular ideas which belong to them. We have once satisfied ourselves, that certain ideas bear certain relations to each other. These relations are unconsciously transferred to their signs, and an endless labour is thus saved. We are thus enabled to go through long trains of reasoning with ease, which, without such signs, would to the strongest mind be impossible. To return to the illustration of Algebra, words are used in reflection and conversation, as letters are used in equations; we have once given to each its particular signification, and we combine and separate them in a thousand different ways, without recalling the ideas they represent till we arrive at the conclusion, perhaps not even then. Let any one attempt to pursue a train of reasoning of any length without the assistance of words, and he will find it impossible. He will find it much the same thing as going through a long arithmetical calculation without the assistance of figures. In this way, language enables us to compare our ideas, and by supplying us with results, at which we could not otherwise arrive, is the source of many of them.

When we make no use of language in thinking, the trains of ideas pass through the mind with great rapidity, and the reasoning power is very feeble. This seems generally to be the state of our minds in dreaming. The rapidity with which ideas often pass through the mind in sleep appears, at first view, incredible. Dr. Gregory used, in his *Physiological Lectures*, to relate the case of a lady, who was subject to dreams while engaged in the common occupations of life; their duration was so short that they often passed unobserved by those who conversed with her; yet it required much time to give an account of the crowd of ideas which in so short a time had passed through her mind. "The rapidity of the succession of transactions in our dreams," says Dr. Darwin, *Zoonomia*, Vol. I. p. 205, "is almost inconceivable; in so much, that when we are accidentally awakened by the jarring of a door, which is opened into our bedchamber, we sometimes dream a whole history of thieves, or fire, in the very instant of waking." This rapidity is too great to permit us to compare our ideas, so that the most incongruous do not seem at all wonderful. We are not surprised to find ourselves suspended in the air, because our ideas pass with too great ra-

pidity to permit us to recollect that this never happened before. But when we converse in our dreams, the charm is dispelled, the rapidity of our ideas is arrested, and the train of thought becomes as consistent with our experience as in our waking hours. This I have often remarked, and on mentioning it to others, have found they had made the same observation.

Many of the phenomena of delirium, as far as I am capable of judging, may be accounted for on the same principles. But there seems to be this difference between dreaming and delirium, that in the latter although the rapid succession of ideas is prevented, we are incapable of comparing them together so as to draw the proper inferences.

NOTE 44.—In considering the symptoms of fever, I have of course confined myself to those which properly belong to it. With regard to a variety of symptoms from local affections which sometimes accompany it, as these form no part of this disease it was not necessary for me to say any thing of them. The nature of many of these local affections, however, tends to throw light on that of the primary disease. By far the most common, are inflammations of various kinds. How nearly the nature of inflammation and that of fever are allied, I have already endeavoured to point out ; and their frequent concurrence seems to confirm what was said on this subject.

NOTE 45.—Hence it seems to be, that obstruction of the mesenteric glands soon occasions fever of however indolent a nature the obstruction may be, while that of other glands seldom has this effect till they become inflamed.

NOTE 46.—That opium only affects the state of the pulse in consequence of its being received into the system by the absorbents, and immediately applied to the heart and blood-vessels, is ascertained, as far as I am capable of judging, by a variety of experiments which I made with a view to determine this point, to which I have already had occasion to refer. And the strong analogy we observe in every instance, between the effects of opium and fermented liquors, leaves little room to doubt that their mode of operation is the same.

NOTE 47.—Much has been said of the effects of cold, and on the question, whether it is to be regarded as a stimulus or sedative. The observations I have had occasion to make on the effects of agents in general on the animal body, will I believe, be found strictly applicable to those of cold. All agents, it was observed, occasion either excitement or atony, according to the degree in which they are applied ; but the degree of atony which a large quantity of any agent produces, is in no particular proportion to the degree of excitement produced by a smaller quantity

of the same agent, some agents being better fitted to occasion excitement, others to occasion atony. Now if we compare the effects of cold with those of opium or wine, we should say that its stimulant bears but a small proportion to its sedative effects. It is only within a very limited range that it acts as a stimulus : compared with these, therefore, it deserves the name of sedative. But if on the other hand, we compare its effects with those of agents still less capable of producing excitement, of tobacco, for instance, for the same reason it deserves the name of stimulus ; and in this way, I believe, all that has been said on the subject may be reconciled.

NOTE 48.—The circulation, we have seen, is most apt to fail on the surface of the body, both because the excitability of the extreme vessels is more readily impaired than that of other parts of the sanguiferous system, and because being more distant from the heart, they are least influenced by the impulse communicated by this organ.

NOTE 49.—The application of cold air to the lungs is almost always invigorating, which seems to arise from two causes ; as the temperature of the lungs does not vary like that of the surface, however cold the air we breathe, it is probable that the temperature in the lungs never falls below that range within which cold acts as a stimulus, (Note 47,) and the colder air being more dense, affords a more copious supply of oxygen.

NOTE 50.—The leprosy of the Jews, and other species of leprosy which raged in the twelfth and thirteenth centuries, are scarcely now to be met with ; and we have a remarkable instance both of the production and disappearance of a contagious disease, in the *Ephmera Britannica*, described by Caius, (*Caius De Ephmera Britannica*.)

The gangrenous sore throat, Allionius (*Allionii Tractatio de Miliarium Origine*.) observes, was scarcely known before 1610. The scarlet fever appears to be of still later origin. Prosper Martianus, who wrote about the middle of the seventeenth century, is amongst the earliest writers on this disease. It soon after made its appearance in London, and was described both by Sydenham and Morton ; and, indeed, so little was it known at this period, that Morton does not always distinguish it very accurately from measles.

Even the small-pox was unknown to the ancients. The Arabian Physicians are the earliest writers on this disease ; and of those whose works have come down to us, Rhazes is the oldest who treats of it. The oldest writer on the small pox mentioned by Rhazes, is Aahron, who resided at Alexandria, in 640 of the Christian æra. Nearly the same observations may be made res-

pecting the measles, although some assert that this disease was not unknown to the ancients. (See the Observations of Matthiew, in *Baldinger's Sylloge Select. Opuse. Vol. IV.*) The Arabian Physicians were certainly the first who accurately described it.

Most writers agree with Allionius, that the miliary fever which appeared at Liepsic in 1652, was the first fever of this kind of which we have any account. The aphthous fever seems also to be of late date, although the term aphthæ frequently occurs in the works of the ancients. "Nam quæ a priscis medicinæ conditoribus aphthæ describuntur, adeo a nostris diversæ sunt, ut toto cælo distent." (*Keislaer, De Aphthis Nostratibus.* Dr. Dickson, (*Transactions of the Royal Irish Academy, for 1787.*) says, that with the exception of one case related by Carolus Piso, he can find no distinct mention of the pemphigus before the days of Morton. Bursærius doubts, if the disease mentioned by Morton be the true pemphigus. The following description of it, however, seems to leave no room to doubt this. "Febris synocha cum vesiculis per pectus et collum sparsis." (*Morton De Feb. Inflam.*) The plica polonicu, as we find from the Address of the Polish Physicians to the University of Paris, also made its first appearance in the seventeenth century.

Dr. Ferriar, in his Medical Observations and Reflections, remarks; "The yaws, the sibbens, and other national infectious disorders, afford strong proofs of the variety of animal poisons: and Mr. Hunter, in his excellent work on the lues, has given good reason for believing that new poisons are constantly produced among the poor of great cities."

NOTE 51.—It is remarked by Dr. Fordice and others, that many brute animals are subject to typhus, when crowded together in ill-ventilated places. It has been observed to arise among hogs, and more frequently among sheep.

It is remarkable, however, that typhus cannot be communicated from brutes to men, nor vice versa. "Illud præterea notabile est venenum pestilentielle hominibus infestum non nocere brutis, it e contrario, brutorum pestem non nocere hominibus." (See the Observations of Waldschmidt, in *Haller's Disp. ad Morb. Hist. et Cur. Pert Tom. V.*) Nor does it appear that one species of brute can communicate it to another. It cannot, for instance, be communicated from hogs to sheep, nor vice versa. It is curious that the contagious fevers of white people are seldom communicated to negroes; and I have been informed by West-Indians, that there are among the negroes many contagious febrile diseases to which white people are not subject.

NOTE 52.—When the power of the contagion is very great, the system sometimes seems incapable of any effort; the retained excreta produce no increased excitement of the heart and larger

vessels, their excitability seeming almost instantaneously destroyed by the action of the contagion. This has sometimes happened in the plague. It is almost unnecessary to observe, that such cases terminate fatally in a very short time.

NOTE 53.—Dr. Lind remarks, that he has often seen these observations confirmed in sailors after they had been for some time on shore. The fever, which seemed at first to be merely the effect of a debauch, or some such cause, soon assumed the precise form of that which raged in the ship they had left. They are farther illustrated by the observations of other writers, and particularly by what Dr. Rush says of his own situation while the yellow fever raged at Philadelphia. See his Account of this fever.

NOTE 54.—The effect of any injury done to the body depend as much on the nature of the part affected as upon the kind and degree of the injury. An extensive inflammation, for instance, may exist in the skin without much general derangement, but the slightest degree of inflammation in the stomach and bowels is immediately felt in every part of the system; and so true is this observation, that from the degree of general derangement which ensues on an injury being done to any organ, we might very accurately estimate its importance to the life of the animal. Thus affections of the mouth occasion less general derangement than those of the pharynx; of the pharynx, less than those of the œsophagus; of this organ, than of the stomach, which is the most important part of the alimentary canal. A similar observation applies to the affections of this canal, if we trace them from its opposite extremity to the stomach. Diseases of the rectum occasion less derangement than those of the higher parts of the great intestines; diseases of these, less than diseases of the small intestines; and of these, less than diseases of the stomach. The same is true of the diseases of the head and thorax; the more vital the part affected, we still find the general derangement the greater.

NOTE 55.—The time required for the contagion of typhus to produce its effects is very various. Sometimes, though very seldom, they are almost immediate. In general the infected feel no symptom of the disease for two, three, or more days, and in some cases, but much more rarely, even for weeks after they receive the contagion.

NOTE 56.—As all the organs of the animal functions are supported by the action of the extreme parts of the vital system, which, we have seen, are always debilitated in fever, we are at no loss to account for the injury occasioned by every thing which tends to excite these organs, which cannot be done, without calling into action, and thus farther exhausting, the capillaries.

NOTE 57.—It appears, from experiments related in the Appendix to the third volume of my Treatise on Febrile Diseases, which I originally made with a view to ascertain the circumstances that occasion a deposition of lithic acid from the urine, that from the state of this fluid we may ascertain the degree of vigor which prevailed in the skin during the time of its secretion. It appears from these experiments, that when the skin is inactive, the urine deposits a large proportion of lithic acid, that as we increase the action of the skin, the deposition of the lithic acid is lessened, and that when the skin is most vigorous, no lithic acid is ever spontaneously deposited from the urine, however long it is kept.

From the same experiments it also appears, that the deposition of lithic acid from the urine is more effectually prevented by the medicines which increase the insensible perspiration than by those which occasion sweat. The following are the observations subjoined to the experiments with diaphoretic and sudorific medicines. It is remarkable, that a small dose of tartar emetic more certainly prevents the deposition of lithic acid from the urine than a large one of Dover's powder, although producing a copious sweat, which may be accounted for in the following manner. It will appear, from what will be said hereafter, that the secretion of the matter which occasions the deposition of the lithic acid from the urine, depends not on the mere relaxation of the kidneys, but on their vigorous action. I should imagine that the same thing takes place in the skin, and that this matter is only separated by it, and thus prevented going off by the kidneys, in proportion to its activity; for it will afterwards appear, that the matter occasioning the deposition of lithic acid from the urine, also passes by the skin; and, indeed, from the experiments already related, we can hardly suppose otherwise. Now the effect of Dover's powder must in a great measure be attributed to the relaxation induced on the skin by the opium it contains; whereas the antimony seems only to increase the natural action of the skin.

To the same circumstances we must also attribute another difference in the effects of these medicines on the urine; while the Dover's powder, for the most part, produced no effect on it, after the sweat had ceased to flow, the antimony continued for several days after it was taken, in a greater or less degree, to influence the state of that secretion. I have also repeatedly observed, that the deposition of lithic acid from the urine was not so effectually prevented by this medicine when it produced nausea, as when it produced no sensible effect; which is to be explained on the same principles.

NOTE 58.—Both the external and internal use of cold water in fever, was known to the ancients; but it is only lately that the

former practice has been revived and demanded much attention. Washing the body with cold water in fevers, is said to have been first practised in modern times, at Breslau, in Silesia; (See a Dissertation entitled, *Epidemia Verna, quæ Wratislaviæ, anno 1737, afflixit, in Act. Nat. Curios. Vol. X.*) and it appears that the practice was followed in some of the neighbouring countries. The external use of cold water in fevers, however, has never been prevalent in Europe, perhaps, as Dr. Currie supposes, from the manner in which it should be regulated not having been understood.

Several late practitioners in warm climates, particularly in the West Indies, have employed it freely; and in 1786, Dr. William Wright, who had practised for many years in the island of Jamaica, gave an account of some cases of fever successfully treated by the effusion of cold water, in the London Medical Journal. Dr. Wright has since published some additional observations on the same subject, in a Letter to Dr. Garthshore, in the seventh volume of the Medical Facts and Observations, in which he gives an account of Dr. Gregory's manner of employing this remedy, and the success which attended its use in the Royal Infirmary of Edinburgh; and in the second volume of Annals of Medicine, he again gives a favourable testimony of its effects in the fevers of the West Indies. Dr. Jackson, (See *his Treatise on the Fevers of Jamaica*,) and others also employed it. Even the alternation of the warm bath and effusion of cold water has been practised in fevers, and it is said with good effect. But no other writer has bestowed so much attention on the external use of cold water in fevers, and so accurately observed its effects, as the late Dr. Currie. See his Treatise entitled, *Medical Reports on the Effects of Water, Cold and Warm, as a Remedy in Fever and other Diseases.*

NOTE 59.—Dr. Hamilton gives the following account of his practice, and of the circumstances which led to it. Speaking of the *calx antimonii nitrata*, he observes: “This antimonial remedy was not ineffectual; but I remarked, that it was beneficial only when it moved the belly. The stools were black and fetid, and in general, copious. On the discharge of these, the low delirium, tremors, floccitatio, and subsultus tendinum, which had prevailed, abated in some cases; the tongue, which had been dry and furred, became moister and cleaner; and a feeble creeping pulse acquired a firmer beat.

“Reflecting afterwards on these circumstances, it occurred to me, as the purgative effect appeared to have been the useful one, that any purgative medicine might be substituted for the *calx antimonii nitrata*; and that by this substitution, the unnecessary debilitation of an exhausted patient, by vomiting and sweating, might be avoided.

“ More extended experience confirmed these conjectures ;
 “ and I was gradually encouraged to employ purgative medi-
 “ cines early in typhus, and to repeat them in the course of the
 “ disease. And after having long and strictly directed my atten-
 “ tion to this point of practice, I am now thoroughly persuaded
 “ that the full and regular evacuation of the bowels relieves the
 “ oppression of the stomach, and mitigates the other symptoms
 “ of fever.” See *Observations on the Utility and Administration*
of Purgative Medicines in several Diseases, by James Hamilton, M.
 D. &c.

I might, from my own experience, were it necessary, add many cases and observations in confirmation of these remarks. But it is sufficient to refer the reader to the Appendix to Dr. Hamilton's work, where he will find a sufficient number of cases to illustrate the effects of the practice there recommended. I shall therefore only add, that I have very generally seen good effects from spontaneous diarrhœa, even in the worst forms of typhus; an observation which obtruded itself upon me many years ago, when, with most other Physicians, I was prejudiced against the use of cathartics in this fever, except as far as was necessary for the regular expulsion of the fæces.

NOTE 60.—It is very remarkable, that in a disease of so much debility as typhus, blood-letting seems always to have been a favourite remedy. Galen and Celsus speak of it in the highest terms. Prosper Alpinus informs us, that the Egyptians let blood in all putrid diseases. Among the moderns, if we look into the works of Sydenham, Hoffman, Huxham, Mead, Hassenhorst, Eller, Pringle, Monro, and indeed all the best Physicians of their days, we shall find, that they recommend too indiscriminate a use of the lancet in fevers. Yet there is hardly any of these writers from whose works we may not collect sufficient evidence of its hurtful effects.

Huxham, in his work on Fevers, observes : “ The first blood
 “ in malignant fevers frequently appears florid ; what is drawn
 “ twenty-four hours after, is commonly livid, black, and too thin ;
 “ a third quantity, lived, dissolved, and sanious. This is fre-
 “ quently the case in malignant fevers. I have sometimes ob-
 “ served the crisis of the blood so broken, as to deposit a black
 “ powder like soot at the bottom, the superior part being a livid
 “ gore, or a kind of a dark green, and exceedingly soft jelly.
 “ Besides, the pulse in these cases, sinks oftentimes surprisingly
 “ after the second bleeding ; nay, sometimes after the first ; and
 “ this I have more than once noted to my great concern and
 “ astonishment, and that even when I thought I had sufficient
 “ indications from the pulse to draw blood a second time.” In
 his *Essay on the Ulcerous Sore Throat*, he observes : “ I have
 “ very often met with this buffy, or sily appearance of the blood

“in the beginning of malignant fevers, and yet blood drawn two or three days after, from the very same person hath been quite loose, dissolved, and sanious as it were ; too many instances of this lately occurred to me among the French captives here, who died by dozens, of a pestilential fever. In this fever the French Surgeons bled every day, or every second day ; and I several times saw the blood of some of the officers a mere sanious gore, on the third or fourth blood-letting.”

On reading observations of this kind, we are inclined to ask, what were the advantages expected from blood-letting in these fevers, that such consequences should have been risked ? To this question we have no answer but that which the favourite hypothesis of the time afforded, which taught, in opposition to every day's experience, that the cause of fever might be as it were drained off by blood-letting.

NOTE 61.—Mr. Clark, in his *Observations on the Diseases of Long Voyages to Hot Climates*, after relating the fatal terminations of three cases, in which blood-letting was employed to lessen violent excitement at the commencement of the remittent of sultry climates, observes, that he has since found it necessary to lay aside blood-letting in these climates, both at sea and on shore, except in cases of local inflammation.

NOTE 62.—The present practitioners of tropical climates, I have been informed, use cathartics more freely in fevers than was done by most of those who have written on the fevers of these climates. On the cathartic effects of calomel in particular they place great reliance, and, indeed, seem often to trust almost solely to it. (59.)

NOTE 63.—When we see a patient labouring under symptoms of extreme debility, and find these symptoms almost uniformly relieved by a considerable quantity of wine, it is difficult, at first view, to persuade ourselves that the wine is pernicious ; but an attentive observer will look beyond its immediate effects, and will then readily see sufficient reason to doubt the safety of this practice. He will find, that the temporary excitement he thus procured is succeeded by a greater degree of debility than that which the stimulus had removed, and if he perseveres in this plan, that in a large proportion of cases the pulse, upon the whole, will gradually become more frequent, and feeble, till it ceases altogether. These effects I have so often witnessed, that I cannot help thinking that almost any fever may be rendered fatal by a certain quantity of wine. And when we recollect that the excessive stimulus of wine is a frequent cause of fever, can we be surprised that the constant repetition of this stimulus should increase its symptoms ?

Beside the apparent good effects of wine for a short time after its exhibition, Physicians have been led to an excessive use of it in typhus by another observation, the comparatively small effects it produces. That a pint of wine in typhus will not produce a greater effect than a glass in health, is adduced as an argument for the pint in the one case being as innocent as the glass in the other.— But it is to be recollected, that wine in typhus, only produces less excitement than in health, in proportion as the remaining excitability is less, and consequently, that a degree of excitement which would occasion little or no inconvenience in health, may produce a fatal exhaustion in typhus. Here there is no excitability to spare, and the first principle of the treatment seems to be as much as possible to prevent its farther exhaustion. A very moderate and uniform exhibition of stimuli seems often necessary, that the action of the central parts of the sanguiferous system may not fall too low to support that of the circumference, but all excitement beyond this seems to have no other effect but that of exhausting the little vigor which yet remains. See the Observations of Dr. James Hamilton on the Use of Wine in Typhus, in his work on Purgative Medicines.

There is a case, which, at first view, may be mistaken for the second stage of fever, in which I have witnessed excellent effects from powerful stimuli, that in which spontaneous gangrene appears in one or more parts, from the failure of the vital principle in particular parts of the capillary system. But here the various secreting organs do their office, and the action of the heart and larger vessels often differs little from that of health. In short, there is no general debility of the vital system, and there seems not the same risk in exciting it to increased action in order either to restore to vigor, or entirely to throw off the debilitated part.

NOTE 64.—As in typhus the circulation, from the feebleness of the powers which support it, must be comparatively slow, the blood must pass less frequently through the lungs, and consequently be less subjected to the action of the oxygenous part of the atmosphere than in health ; and that this is really the case, appears from its being more venous. The effects of the less frequent passage of the blood through the lungs would probably, as far as respects the change occasioned by the oxygenous part of the atmosphere, be counteracted by supplying the patient with air containing a larger quantity of oxygen, in proportion as the circulation is less rapid. What effect correcting the venous state of the blood in typhus might have, it is difficult to say.

NOTE 65.—I have seldom found the powder of bark, although more efficacious than the infusion, tincture, or extract, well suited to the common continued fever of this country. It is apt to

oppress the stomach, disorder the bowels, and prevent the return of appetite. When symptoms of malignity, and particularly when a tendency to gangrene appears, it seems to be a valuable medicine, and should perhaps be given in as large doses as the stomach can easily bear. In whatever from bark is given, its good effects seem generally increased, and it is rendered more grateful to the stomach by giving along with it some of the mineral acids particularly the sulphuric acid, if there is a tendency to sweats which do not relieve the symptoms.

Both the mineral and vegetable acids, indeed, deserve the name of tonics ; and in fever they sometimes seem more beneficial than any other we possess. In eastern countries the cure of fever is often trusted wholly to the juice of acid fruits.

When the appetite does not return readily, and the patient continues subject to renewals of feverish heat, I have found the more simple bitters, the gentian, for example, answer better than either the bark, or colomba.

NOTE 66.—We should not err much, I believe, by laying it down as a general rule, not to permit the use of animal food in any form while the pulse retains a considerable degree of frequency, and the patient continues subject to returns of feverish heat, whatever be the state of the appetite. I have found the disease more tractable since I followed this rule. Recovery seems to go on more uniformly, and the return of strength, so far from being delayed, seems to be promoted by it, not to mention that the risk of relapse is much lessened. Dr. Fordyce, in one of his Dissertations on Fever, makes some excellent remarks on the use of solid animal food towards the favourable termination of fevers. “ Even after the disease has been terminated by a crisis, “ animal food, in a solid state, should be rejected, there being no “ cause which has produced relapses, so far as the author’s experience has gone, so frequently as using solid animal food too “ soon. Supposing even that a complete crisis should have taken place, and entirely terminated the disease, it ought to be at “ least five or six days before any solid animal food is ventured “ upon.

“ The author wishes to press this more strongly, because if a “ perfect crisis should take place, the appetite often returns, and “ the patient is left in a very weak state. It has in this case been “ often conceived by the patient, and much more frequently by “ the by-standers, that solid animal food would restore his strength “ soon. It must, however, be remembered, that when a complete crisis takes place, and carries off the fever entirely, the “ depression of strength, which was a symptom of the fever, “ ceases, and the weakness which was produced by the exertions “ and derangements of the faculties of the system, is no longer “ increasing ; and that the patient, with very moderate nourish-

“ment, and the sleep and rest, which are so apt to ensue after
“the fever has been completely carried off, will have his strength
“restored in a very short time, without using any thing that shall
“run any risk of re-producing the disease.”

Although the patient should be restricted both with respect to the quality and quantity of his food, he should be allowed to eat as frequently as he pleases ; and when the appetite begins to return, he should be reminded not to be too long without taking something. This both prevents the risk of his eating too much at one time, and the lowness which generally attends an empty stomach when there is any appetite. “Perhaps,” says Sir John Pringle, “there is no rule more necessary than never to let the patient, “when low, remain long without taking something cordial or “nourishing ; as I have seen men, once in a promising condition, “sink past recovery, by being allowed to pass a whole night without any support about the time of the crisis.” See Sir John Pringle’s *Treatise on the Diseases of the Army*.

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